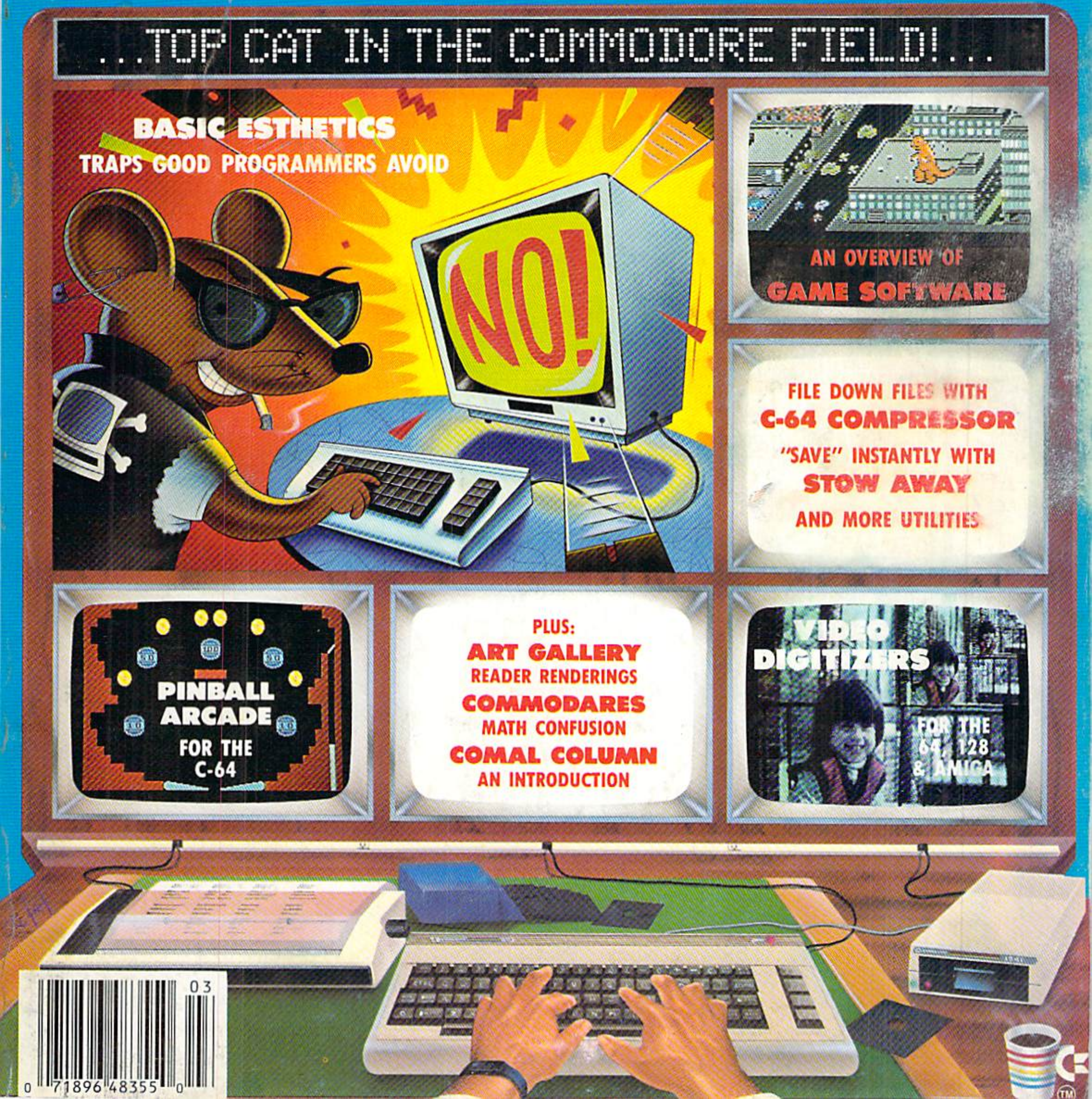
COMMODORE USERS

Ahoy!

$2.95/ CAN. $3.35 MAR. 1987

48355



03
0 71896 48355 0

THE COMMODORE USERS

Ahoy! Access

Clipper

MARCH 1987

10% OFF ANY ACCESS PRODUCT...

This issue we are pleased to have **Access Systems** joining us with an offer for the first time. **Access**, as you probably know, makes some very interesting programs, including *Leader Board*, a nifty pro golf simulator, *10th Frame*, a professional bowling simulator, and their latest and greatest product, the *Robotic Workshop*.

When I was seven years old, I wanted an Erector Set more than anything else in the world. Fortunately for my sons, the *Robotic Workshop* from **Access Systems** is a computer-age version of the Erector Set. They have had a fantastic time with this fabulous, space-age learning tool. With hundreds of projects and experiments, the *Robotic Workshop* shows how computers and other devices interact in the real world. Whether you're a beginner dabbling in robotics or an enthusiastic hobbiest, you'll appreciate seeing how this fascinating new field will be interacting with your life in the future. Demonstrating computer-controlled, electro-mechanical operation through experiments with hardware and software, each unit of the *Robotics Workshop* contains the computer interface to connect to your home or personal computer. Also included with the Workshop are all motors, sensors, snap-together mechanical parts, software, complete project experiment instructions, and a 136-page spiral-bound manual. For more information on the *Robotics Workshop*, look for **Access Systems**' ad in this month's issue of *Ahoy!*

And now, until April 1, 1987, you may purchase the *Robotics Workshop* or any of the other excellent programs from **Access Systems** for 10% OFF when you order directly from them. You may order by phone with your VISA or MasterCard by calling (801) 298-9077 and mentioning that you saw this offer in the *Ahoy! Access Clipper*. (Please do not call their 800 number to order!) Or, you may use the handy coupon on page 3 of this *Clipper*. But don't wait, because this offer disconnects on April 1, 1987.

Ahoy! *Readers:*

In this issue of the Clipper *we have lots of discounts and gift offers to help brighten these dreary winter days. You can SAVE 10% on your first order of software from* **Computer Centers of America**, *get a FREE DISK NOTCHER with the purchase of two boxes of already discounted disks from* **American International Computer Products**, *and even enjoy SUBSTANTIAL SAVINGS on the nifty Robotics Workshop from* **Access Systems**. *Because tax time is here again, there's a great 15% DISCOUNT on* Tax Master *from* **Master Software**. *And if you need cables, you'll SAVE 20% on your first order from* **Precision Peripherals**.

So dear readers, enjoy the savings, and don't forget to look for the next Clipper *in the May issue of* Ahoy!

Admirally yours,

Joe Ferguson

Joe Ferguson
Director
Ahoy! *Access Club*

SUPER SAVINGS ON PAGE THREE

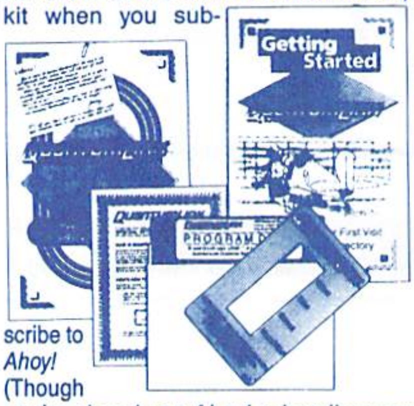
DOUBLE THE DISKS... HALF THE PRICE...

Just before Christmas, I was looking for a gift to give a fellow computer enthusiast. When I found out he didn't own a Disk Notcher, I decided it would be the perfect present. For those few of you who don't know, a Disk Notcher allows you to use the other side of your single-sided, double-density disks by merely adding a notch in the right place. So effectively, you double your disk storage capacity and you need to spend only half as much money on disks. The Disk Notcher even enables you to use the blank side of some preprogrammed disks.

Now for a limited time **American International Computer Products (AICP)** is offering a FREE DISK NOTCHER when you buy two boxes of **AICP**'s 1st quality, single-sided, double density disks at the very reasonable price of $7.95/box of 10 disks. (**AICP** also sells a wide variety of Commodore and Commodore-compatible hardware and software at prices worth looking at when you're shopping.) You will need to add $3.50 for shipping and handling, and New York residents need to add 8¼% sales tax. Simply clip the **AICP** Coupon on page 3 of this *Clipper* and send it along with your payment. Or you may call **AICP** at (800) 634-AICP, or in New York State at (718) 351-1864, mention you saw this offer in the *Ahoy! Access Clipper*, and order with your credit card. (Credit card orders are subject to a 4% surcharge.) But don't wait, 'cause this offer expires April 1, 1987.

FREE MODEM...

QuantumLink is one of the better bulletin board services for online games, Commodore user group support, software reviews and live conferences. The advertisement on the inside back cover of this issue of *Ahoy!* tells you how you can receive a free **QuantumLink** membership kit when you sub-



scribe to *Ahoy!* (Though you're already an *Ahoy!* subscriber, you can take advantage of this offer by extending your existing subscription.)

Additionally, **QuantumLink** is making the following offer available only to *Ahoy!* Access Club members: you can get FREE **QuantumLink** software *plus* a FREE 300 baud auto-dial modem—when you pay for 4 months of **QuantumLink** Basic Service ($9.95/month) at $39.80. Order your FREE **QuantumLink** software and FREE 300 baud auto-dial modem by either clipping the coupon on page 3 or sending your check for $39.80 to cover your first 4 months of **QuantumLink** Basic Service to: Quantum Computer Services Inc., 8620 Westwood Center Drive, Vienna, VA 22180—or for faster service, call 1-800-392-8200 and ask for Dept. 25. This offer expires April 1987.

FREE CALCULATOR WITH $10 PURCHASE FROM S & S...

S & S Wholesalers has very good prices, perhaps the best you'll find anywhere on Commodore and Commodore-compatible hardware and software. Since they're a new advertiser in *Ahoy!* they're anxious for you to consider buying from them when you're in the market. So they're making you this exciting offer: When you clip the **S & S** Coupon on page 3 of this *Clipper* and send it along with your order of at least $10, you'll receive an Electronic LCD Calculator ABSOLUTELY FREE. It would cost almost $10 to buy the calculator alone. It's **S & S**'s way of introducing you to their good prices and excellent service. See their ad in this month's issue of *Ahoy!* If you're in a hurry, you may call them at (800) 233-6345, or in Florida call (305) 538-1364. But be sure to mention that you saw this offer in the *Ahoy! Access Clipper,* so that you receive your FREE CALCULATOR. This offer expires on April 1, 1987, so mail your order RIGHT AWAY!

PAY LESS TAXES...

With April 15th right around the corner, it's time once again to turn our attention to filing last year's taxes. Last year, I did a very intelligent thing. Instead of paying my accountant $175 to prepare my taxes, I bought *Tax Master* from **Master Software.** *Tax Master* computed all my various deductions and even helped me remember some I had forgotten. It transferred numbers between forms and calculated my refund with ease. The *Tax Master* package includes Forms 1040 and 4562, plus Schedules A, B, C, D, E, and F. The package also includes tax tables and a discount coupon towards the purchase of next year's updated package. I paid $30 for this helpful disk, but you as an *Ahoy!* reader may clip the **Master Software** Coupon on page 3 of this *Clipper* and take $5 OFF. **Master Software** accepts VISA and MasterCard on phone orders, so call (301) 922-2962 TODAY! If you call, be sure to mention you saw this offer in the *Ahoy! Access Clipper* to receive your $5 SAVINGS. This excellent price includes delivery. Maryland residents, please don't forget to add 5% sales tax. This offer expires April 1, 1987. So call or send in your order RIGHT AWAY!

20% OFF CABLES FROM PRECISION PERIPHERALS...

I'm basically a lazy person. If there's a device to save me time and/or effort, I almost always *have* to have it. Recently, I got tired of unplugging my phone every time I wanted to communicate with my modem or plug in my answering machine. That's when I discovered the terrific 5 Terminal Phone Expander from **Precision Peripherals.** Plugging directly into my current phone jack, the 5 Terminal Phone Expander allows me to plug in my phone, modem, auto-dialer, answering machine, and any other device, simultaneously. No more unplugging for me! And this dandy gadget is a bargain at its reasonable price of $14.95.

Started one year ago as a one-person, one-product company, **Precision Peripherals** marketed the Ultravox Sound System, the only stereo simulator for your Commodore 64. It took only four months for **Precision Peripherals** to grow to four products. Now, **Precision Peripherals** has expanded into the full range of computer accessories with an emphasis on cables.

And their growth is no accident. **Precision Peripherals** prides itself on customer service. They have knowledgeable people on the phones. If they don't have a particular product, they'll find it. If they can't find it, they'll make it. They'll really go out of their way to help you.

Precision Peripherals wants you to consider them your Cable Headquarters, so for a limited time, you may take 20% OFF any cable (limit 2/customer). Be sure to check out their ad in this month's issue of *Ahoy!* In it you'll find a complete list of cables and other products offered by **Precision Peripherals.** Then clip the **Precision Peripherals** Coupon on page 3 of this *Clipper,* and send it along with your order. Or you may order by calling (503) 254-7855 and mentioning that you saw this offer in the *Ahoy! Access Clipper.* But this offer expires April 1, 1987, so mail your order TODAY!

MORE SAVINGS FROM ABACUS...

Abacus Software, one of the leading marketers of Commodore-compatible software, has recently published a book called *GEOS Inside and Out.* It was the first book available on GEOS and is already **Abacus'** best seller. With introductory as well as in-depth information, *GEOS Inside and Out* will provide valuable assistance to you, no matter what your skill level. Whether you are a beginner or an advanced user, you'll find this book is just what you need to get the most out of your new GEOS program. The book sells for $19.95, plus $4 for shipping and handling, and if you're serious about ordering it, read on.

This month **Abacus** is continuing their generous coupon offers. The **Abacus** coupons on page 3 of this *Clipper* are redeemable for $5 OFF the purchase of any book (including *GEOS Inside and Out*) and $10 OFF the purchase of any software package, purchased directly from **Abacus.** (Neither of these coupons is good for optional diskettes with books.) You must redeem these coupons through the mail, but don't wait, because these coupons are invalid after April 1, 1987.

25% OFF THE FIRST EVER...

Wouldn't it be terrific if you could play a modem game without paying a service charge or accessing a mainframe? Well, now for the first time ever, you can! With **Dreamrider**'s *Operational Terminal* you can play a full-color, person-to-person search game. With *Operation Terminal,* you'll enter a world of fast-action and espionage, as you search the mysterious Antimatter Complex for top secret documents. It's a game of strategy that's challenging, yet easy to play. To play with a friend, all you need is to have a modem, buy *Operation Terminal,* and link up with a friend who also has a modem and the game. As an introduction to this innovative concept, **Dreamrider** is offering a generous 25% DISCOUNT off the regular price of $39.95, so you'll pay only $29.95 for this groundbreaking software. Simply clip the **Dreamrider** Coupon on page 3 of this *Clipper,* and send it along with your payment. You will need to add $2.50 for shipping and handling. But don't wait to order, 'cause this offer unlinks on February 1, 1987.

The Ahoy! Access Clipper *is published bimonthly by* Ahoy! *magazine and sent free to selected subscribers of* Ahoy! Ahoy! *is a monthly publication of Ion International Inc. The cost of a one-year subscription is $23.00; two years are $44.00. Inquiries regarding subscriptions to the magazine should be addressed to Ion International Inc., 45 West 34th Street, Suite 407, New York, New York 10001.*

10% OFF FROM ACCESS SYSTEMS

Mail to:
Access Systems
#A 2561 1560 West
Woods Cross, Utah 84087

For faster service, call (801) 298-8077.
VISA and MasterCard accepted.

YES, **Access Systems**, I want to SAVE 10% on your excellent programs. My order is enclosed.

FREE DISK NOTCHER FROM AICP

Mail to:
American International Computer Products
Box 1758
Staten Island, New York 10314

For faster service, call (800) 634-AICP, or in New York call (718) 351-1864.

YES, **AICP**, I want my FREE DISK NOTCHER. My order for two 10-packs of your 1st quality, single-sided, double-density disks is enclosed, as is my payment of $19.30 ($15.80 for the disks and $3.50 for shipping and handling). New York residents: Please add 8¼% sales tax.

FREE MODEM FROM QUANTUM COMPUTER SERVICES

Mail to:
Quantum Computer Services Inc.
8620 Westwood Center Drive
Vienna, Virginia 22180

YES, **Quantum**, I want to receive my FREE MODEM by paying now for 4 months of QuantumLink Basic Service ($9.95/month). My payment of $39.80 is enclosed. Thanks!

GREAT SAVINGS FROM ABACUS SOFTWARE

Mail to:
Abacus Software
P.O. Box 7211
Grand Rapids, Michigan 49510

YES, **Abacus**, I want to SAVE $5 on the purchase of one of your books and/or SAVE $10 on the purchase of one of your software packages. I understand this coupon is not valid towards the purchase of Optional Diskettes for Books. My order is enclosed. Thanks so much!

$5 OFF MASTER SOFTWARE'S TAX MASTER

Mail to:
Master Software
6 Hillery Court
Randallstown, Maryland 21133

For faster service, call (301) 922-2962.

YES, **Master Software**, I want to SAVE $5 on Tax Master. I understand that the low discounted price of $25 even includes delivery. My order is enclosed. Thanks! Maryland residents: Please add 5% sales tax.

Name on Credit Card____________________

Credit Card #________________Exp. Date_____

Signature________________________

20% OFF CABLES FROM PRECISION PERIPHERALS

Mail to:
Precision Peripherals and Software
P.O. Box 20395
Portland, Oregon 97220

For faster service, call (503) 254-7855.
VISA and MasterCard accepted.

YES, **Precision Peripherals**, I'd like to SAVE 20% on cables. I understand my limit on this discount is two cables. My order is enclosed.

Name on Credit Card____________________

Credit Card #________________Exp. Date_____

Signature________________________

FREE CALCULATOR FROM S & S

Mail to:
S & S Wholesalers
226 Lincoln Road
Miami Beach, Florida 33139

For faster service, call (800) 233-6345, or in Florida call (305) 538-1364.

YES, **S & S**, I want my FREE CALCULATOR. My order of $10 or more is enclosed. Thanks!

Name on Credit Card____________________

Credit Card #________________Exp. Date_____

Signature________________________

25% OFF DREAMRIDER'S OPERATION TERMINAL

Mail to:
Dreamrider
970 North Main Street
Crete, Illinois 60417

YES, **Dreamrider**, I want to SAVE 25% on your innovative, person-to-person modem game, *Operation Terminal*. My payment of $29.95, plus $2.50 for shipping and handling is enclosed.

Name____________________

Address____________________

City/State/Zip____________________

This offer expires April 1, 1987.

Name____________________

Address____________________

City/State/Zip____________________

This offer expires April 1, 1987.

Name____________________

Address____________________

City/State/Zip____________________

This offer expires April 1, 1987.

Name____________________

Address____________________

City/State/Zip____________________

This offer expires April 1, 1987.

Name____________________

Address____________________

City/State/Zip____________________

This offer expires April 1, 1987.

Name____________________

Address____________________

City/State/Zip____________________

Please allow 1 to 2 weeks for delivery.
This offer expires April 1, 1987.

Name____________________

Address____________________

City/State/Zip____________________

This offer expires April 1, 1987.

Name____________________

Address____________________

City/State/Zip____________________

This offer expires April 1, 1987.

Ahoy!

CONTENTS

DEPARTMENTS

FEATURES

PROGRAMS

Cover art by James Regan and Tom Cushwa; photos by Michael R. Davila and Morton Kevelson

President/Publisher
Michael Schneider

Editor
David Allikas

Art Director
JoAnn Case

Managing Editor
Michael R. Davila

Senior Editors
Tim Little
Tim Moriarty

Production Director
Laura Pallini

Technical Editors
David Barron
Bob Lloret

Consulting Editors
Ben Bova
Morton Kevelson
Dale Rupert

Entertainment Editor
Arnie Katz

Art Production
Christopher Carter
Victoria Green

Bulletin Board SYSOP
B.W. Behling

Circulation Director
W. Charles Squires

Advertising Director
Lynne Dominick

Director of Promotion
Mark Kammerer

Controller
Dan Tunick

Managing Director
Richard Stevens

Advertising Representative
JE Publishers' Representative
6855 Santa Monica Blvd., Suite 200
Los Angeles, CA 90038
(213) 467-2266
Boston (617) 437-7628
Dallas (214) 660-2253
New York (212) 724-7767
Chicago (312) 445-2489
Denver (303) 595-4331
San Francisco (415) 864-3252

ISSUE NO. 39 MARCH 1987

Ahoy! (ISSN #8750-4383) is published monthly by Ion International Inc., 45 W. 34th St., Suite 407, New York, NY, 10001. Subscription rate: 12 issues for $23.00, 24 issues for $44.00 (Canada $30.00 and $55.00 respectively). Second class postage paid at New York, NY 10001 and additional mailing offices.

Postmaster, send address changes to *Ahoy!*, 45 W. 34th Street, Suite 407, New York, NY 10001. Direct all address changes or matters concerning your subscription to *Ahoy!*, P.O. Box #341, Mt. Morris, IL 61054. All editorial inquiries and software and hardware to be reviewed should be sent to *Ahoy!*, 45 W. 34th St., Suite 407, New York, NY 10001.

LYCO COMPUTER
Marketing & Consultants

LYCO'S FULL PRINTER LINE!

star micronics



1 - Year Waranty

NX-10C $215

SAVE WITH THESE PRICES

STAR MICRONICS

NX 10C	215
NL-10	229
NX-10	209
NB-15	CALL
SD-15	438
SR-10	469
NX-15	339

PANASONIC

1080i	199
1091i	269
1092i	(NEW)
1592	419
1595	549
3131	375
3151	SAVE
1080 AP	239

OKIDATA

Okimate 20 ST	189
120 NLQ	225
182	214
192+	365
193+	559
292	449
293	599

EPSON

LX 86	225
FX 85	355
EX 800	479
EX 1000	669
FX 286	479
LQ 800	529
LQ 1000	729

TOSHIBA

321 P/S	479
351 sheet feeder	529
P 341 P	669
P 341 S	699
P 351 +	999

SEIKOSHA

SP-1000 VC (C-64)	165
SP-1000 A centronics	185
SP-1000 IBM	185
SP-1000 AS RS-232	185
SP-1000 AP APIIc	185
BP-1300 AI	419
BP-5420	1075
BP-5300 AI	CALL
Color Kit	119
BP-5420 ribbon	12.50
SP-1000 ribbon	8.50

CITIZEN

120-D	179
MSP-10	285
MSP-15	385
MSP-20	325
MSP-25	485
Premier 35	469

JUKI

Juki 6100	399
Juki 5510	435
Juki 6300	739
RS-232 serial board	55

SILVER REED

EXP 420 P	209
EXP 600 P	489
EXP 800 P	649
EXP 770	740

DIABLO

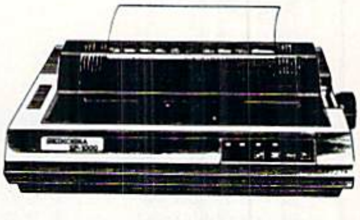
D25	549
P-32 CQ1	699
635	1029
D-80 1F	2395

LEGEND

808	159
1080	199
1380	229
1385	289

SEIKOSHA

2-Year Warranty



SP-1000 VC $165

INTERFACING

ORANGE MICRO

Grappler CD	69

XETIC

Super Graphix	64.64
Super Graphix Sr.	45.64

TYMAC

Connection	49

DSI

DPI	44.95

DISKETTES

	5¼	3.5
MAXELL		
SSDD	9.99	16.99
DSDD	12.99	23.99
BONUS		
SSDD	6.99	—
DSDD	7.50	—
SKC		
SSDD	8.50	14.99
DSDD	9.50	19.99





LYCO'S WAREHOUSE provides you access to the Nation's largest inventory!





DRIVES

COMTEL

Enhancer 2000	149

INDUS

GT-6X	179

COMMODORE

1541C, C1571	CALL

MONITORS

TEKNIKA

MJ-22	249
MJ-305 RGB	309
MJ-503	529

ZENITH

ZVM 1220	89
ZVM 1230	89
ZVM 1240	139
ZVM 1330	385

COMMODORE

1902 Color	289
1802 C	215

PANASONIC

TR-122 MYP 12" Amber TTL	139
TR-122-M9P 12" Green TTL	139

HITACHI

MM-1218 12" Green	99
MM-1220 12" TTL Amber	129
CM-1216 D 12" RGB	385
CM-1455 S 13"	525

THOMSON

365 12 RGB	CALL
Monochrome from	89

HI RES RGB AVAILABLE!

MODEMS

SUPRA

1064	49.95

COMMODORE

1670	129

CALL TOLL FREE 1-800-233-8760

IN PA 717-494-1030
CUSTOMER SERVICE 717-494-1670
or send to
Lyco Computer
P.O. Box 5088
Jersey Shore, PA
17740

MASTERCARD VISA

HOURS
Mon-Thur 9 AM-8 PM
Fri 9 AM-6 PM
Sat 10 AM-6 PM

Reader Service No. 255

Risk Free Policy

In-stock items shipped within 24 hrs of order. No deposit on C.O.D. orders. Free shipping on prepaid cash orders within the continental U.S. Volume discounts available. PA residents add sales tax. APO, FPO and international orders add $5.00 plus 3% for priority mail. Advertised prices show 4% discount for cash, add 4% for Master Card and VISA. Personal checks require 4 weeks clearance before shipping. We cannot guarantee compatibility. We only ship factory fresh merchandise. Ask about UPS Blue and red label shipping. All merchandise carried under manufacturer's warranty. Return restriction applicable. Return authorization required. All items subject to change without notice.

S & S Wholesalers, Inc.

226 Lincoln Road • Miami Beach, FL 33139

1-800-233-6345
ORDERS ONLY

COMMODORE HARDWARE

C128 Computer	$259.90
C1571 Disk Drive	$239.90
MPS 1000 Printer	$249.90
C1902 Monitor	$288.00
C1350 Mouse	$ 37.90
C1660 300 Baud Modem	$ 49.90
C1670 1200 Baud Modem	$148.90
C64 Computer	$139.90
64C Computer	$ CALL

MONITORS

Samsung 14" Color	$139.90
Samsung Green 12"	$ 49.90
80 Col. Cable	$ 8.77
Monitor Cable	$ 5.77
NEC 12" Color	$134.90

DISKETTES

Sony DSDD 5¼"	$ 9.97
Memorex DSDD 5¼"	$ 8.97
Precision DSDD 5¼"	$ 7.97
Bonus by Verbatim DSDD 5¼"	$ 6.97
Sony 3½" DSDD	$ 25.50
Sony 3½" SSDD	$ 19.50
Winners 3½" DSDD	$ 24.00

PRINTERS

Okimate 10	$124.77
Okimate 20	$134.77
Plug-N-Print C64	$ 59.77
Plug-N-Print Amiga	$ 69.77
Panasonic 1091	$224.77
Panasonic 1080	$199.77
Star NX 10	$239.77
Star SG10C	$228.77
Okimate 120	$224.77
Epson LX 80	$239.90
Epson FX 85	$369.90
Epson FX 286	$479.90

JOYSTICKS & ACCESSORIES

WICO The Boss	$ 10.77
WICO Bat	$ 14.77
WKO 3 Way	$ 18.77
Kraft	$ 6.77
Recoton Big Shot	$ 11.77
5¼" Drive Cleaner	$ 6.77
3½" Drive Cleaner	$ 14.77
CRT Cleaner	$ 14.77
C64 Cover	$ 6.77
C128 Cover	$ 7.77
Drive Cover	$ 7.77
Printe Head Cleaner	$ 7.77

ABACUS

Assembler Monitor	$ 24.99
Basic 128	$ 39.99
Basic 64	$ 24.99
Cadpak 128	$ 39.99
Cadpak 64	$ 27.99
Chartpak 128	$ 27.99
Chartpak 64	$ 24.99
Cobol	$ 27.00
Forth	$ 26.90
Powerplan	$ 26.90
Quick Copy 2.0	$ 14.90
Super C Compiler	$ 39.90
Super Pascal	$ 39.90
T.A.S.	$ 39.90
Video Basic	$ 27.90
XPER	$ 39.90

SOFTWARE CLOSEOUTS

Zork I	$ 4.77
Zork II	$ 4.77
Zork III	$ 4.77
File Now	$ 7.77
Calc Now	$ 7.77
Frogger	$ 7.77
Q Bert	$ 7.77
Popeye	$ 7.77
Multiplan	$29.77
Triad	$ 4.77
Battlezone	$ 7.77
Robotron	$ 7.77
Rack-Em Up	$ 6.77

COMMODORE CLOSEOUTS

VIC 1525 Graphics Printer	$ 99.90
MPS 801 Printer	$ 97.90
MPS 803 Printer	$109.90
C1600 300 Baud Modem	$ 37.90
Commodore Plus/4	$ 79.90

CLOSEOUT

"MUPPET PAD" By Koala Technologies	$ 19.77

1-800-233-6345
ORDERS ONLY

MASTERTRONIC

Last V8	$ 6.49
5 A Side	$ 6.49
Slugger	$ 6.49
Paul Macartney	$ 6.49
BMX Racer	$ 6.49
Sky Jet	$ 6.49
Line Action Biker	$ 6.49
Skiwriter	$ 11.99
Busicalc 3	$ 11.99
Instant Recall	$ 11.99
• All 3	$ 29.97

TIMEWORKS

Data Manager 128	$ 37.77
Swiftcalc 128 w/Sideways	$ 37.77
Wordwriter 128 w/Spell Check	$ 37.77
Partner 128	$ 37.77
All Four	$149.90
Data Manager	$ 27.77
Word Writer	$ 27.77
Swift Calc	$ 27.77
All Three	$139.77

EPYX

Summer Games	$ 23.90
Summer Games II	$ 23.90
Winter Games	$ 23.90
Fast Load	$ 23.90
Multiplan	$ 39.90
World Karate Champ	$ 17.90
Worlds Greatest Baseball	$ 22.90
Koronis Rift	$22.90
Eidolon	$ 22.90

ACCESS

Mach 5	$ 22.50
Mach 128	$ 29.90
Leader Board	$ 23.90
Tournament Disk	$ 12.90

PRECISION

Superbase 64	$ 47.77
Superscript 64	$ 47.77
Superbase 128	$ 52.77
Superscript 128	$ 52.77

MICROPROSE

Acrojet	$ 20.77
F15 Strike Eagle	$ 19.47
Conflict in Vietnam	$ 19.47
Gunship	$ 22.77
Silent Service	$ 24.77

DIGITAL SOLUTIONS

Pocket Writer 64	$ 23.77
Pocket Writer 128	$ 28.77
Pocket Planner 64	$ 23.77
Pocket Planner 128	$ 28.77
Pocket Filer 64	$ 23.77
Pocket Filer 12	$ 28.77

SUBLOGIC

Jet	$ 25.70
Flight Simulator II	$ 31.70
Scenery Disks 1-6	$ 13.70
Scenery Disk 7-12	$ 13.70
Scenery Disks 6 Pack	$ 69.70

BRODERBUND

Karateka	$ 17.00
Printshop	$ 25.90
LIB 1/2/3	$ 14.90
Companion	$ 24.90
Bank St. Writer	$ 32.90

SPRINGBOARD

Newsroom	$ 29.00
Clip Art I	$ 18.90
Clip Art II	$ 22.00

AMIGA

Call for Pricing
...IN STOCK...

BATTERIES INCLUDED

Consultant	$ 35.77
Paperclip	$ 35.97
Paperclip w/Spell	$ 47.77

ACCOLADE

Dam Busters	$ 17.90
Fight Night	$ 17.90
Hardball	$ 17.90
Law of the West	$ 17.90

ORDERS ONLY
1-800-233-6345

CUSTOMER SERVICE OR IN FLORIDA (305) 538-1364
FREE FREIGHT ON ALL ORDERS OVER $100.00

Orders under $100.00 add $4.00 shipping and handling. C.O.D. orders add $4.00 prices reflect a 3% cash discount. Add 3% for VISA/MC AMEX
Personal checks allow 2 wks for processing Prices Subject to Change Without Notice

ORDERS RECEIVED BEFORE 12:00 PM WILL BE SHIPPED SAME DAY. Florida residents add 5% sales tax

Reader Service No. 246

VIEW FROM THE BRIDGE

With so many programs and articles to profile on this page every month, we seldom have space to wax theoretical on the state of our industry as other computer magazine editors do. But as we enter a new year together (we're writing these words on December 31), we admit to a feeling of gushing optimism unlike any we've experienced since the boom of early '84. Commodore is jitterbugging around its deathbed, and a pared-down, firmed-up field of third party manufacturers are producing a steady stream of quality software and hardware. 1987 seems certain to be a red-letter year for Commodore computing.

And our eyes are red after straining them all month to make the March *Ahoy!* extra-special—as is evidenced by the following features:

• Last month's overview of Amiga RAM expanders doubtless aroused envy in C-64/128 users who have not been treated to one of Morton Kevelson's patented product comparisons in several issues. But this time around, Morton makes everyone happy with a lens-eye look at video digitizers that spans our regular *Reviews* section (turn to page 63) and *Amiga Section* (turn to page 53).

• In recent months, we thought long and hard about what our next new column should be devoted to. We wanted a subject area of certain interest to Commodore users that had never received monthly coverage in our magazine or anyone else's. We came up with COMAL, a choice dictated in part by the interest generated in the language by the inclusion of COMAL programs on many recent *Ahoy! Disks* (including this month's). We didn't have to think long or hard about who should write the column. We've been trying to get *Ahoy!* reviewer Richard Herring back into the magazine on a monthly basis ever since his acclaimed educational software miniseries of 1984. An expert on all things Commodore, we're sure that he'll prove the perfect guide to COMAL's many facets. (Turn to page 73.)

• Dale Rupert digresses from his monthly task of teaching the nuts and bolts of programming to discuss some of its finer points. His *Rupert Report* on *Basic Esthetics* will help you hone to perfection aspects of your programs that you may have neglected. (Turn to page 32.)

• *C-64 Compressor* helps you overcome one of the 1541's severest limitations—amount of storage space per disk—by compacting any area of RAM, even that under the BASIC and Kernal ROMs. (Turn to page 78.)

• Don't go looking for flipper buttons on the sides of your 64. There aren't any—no matter how difficult Tony Brantner's *Pinball Arcade* makes that to believe. (Turn to page 29.)

• As the specters haunting your house attempt to put its *Lights Out*—and yours with them—you must race to turn them all on, thereby banishing the boogers. Walter E. Meyers' latest effort also serves as a tutorial on the USR command. (Turn to page 22.)

• Don't stop running now! You'll need all your speed to succeed at *Wizard Tag,* in which you must scour a castle for keys that will make the title character appear so you can bag him. (Turn to page 31.)

• Buck Childress' *Stow Away* allows C-64 users to temporarily "save" programs in invisible RAM without the need for disk or tape operations. (Turn to page 62.) And his *Rescue 128* will restore to memory any accidentally NEWed programs—an excellent alternative to making your C-128 completely flat. (Turn to page 77.)

• Though the *Caverns of Geehonk* may sound too ridiculous to be afraid of, you'll change your mind as deadly columns begin descending from the ceiling, threatening to destroy your ship. (Turn to page 26.)

• This month's *Entertainment Software Section* includes two main features: *Fun for All,* profiling the best of the most recent multiplayer releases for the 64/128, and an installment of *Under Construction* dealing with *Ultimate Wizard.* Also included are reviews of *The Movie Monster Game, Warship,* and *Championship Wrestling.* (Turn to page 41.)

We'd tell you more—but with all the excitement we've described, we'd be surprised if anyone was still reading!

—David Allikas

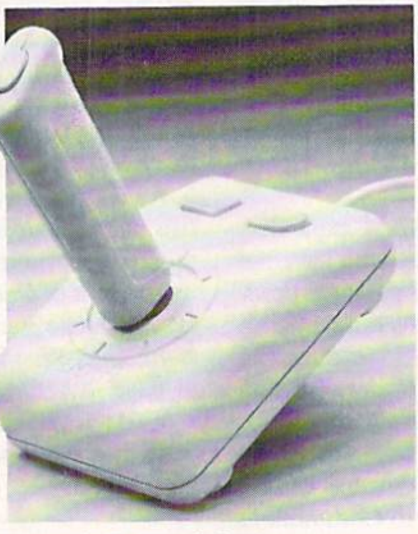
SCUTTLEBUTT

EPROM STORAGE • PET SOFTWARE • 128 STOCK ANALYSIS • GRAPHICS CONVERTOR • TAX PROGRAMS • JOYSTICK • GAMES FROM ELECTRONIC ARTS, ACTIVISION, ACCOLADE • LASER UTILITY • AMIGA HARD DRIVES, SIDECAR, COMPILER, DISK MANAGER • $2.50 PD DISKS • CAR LEASING

NEW JOYSTICK

Suncom's Tac5 joystick ($16.99) utilizes technology that supposedly increases its level of responsiveness, user feedback, and reliability as compared to conventional designs. A two-year limited warranty is included.

Suncom Inc., 312-459-8000 (see address list, page 14).



Suncom's Tac5 includes 2-year warranty.
READER SERVICE NO. 289

C-64/128, AMIGA GAMES

The second in Simon and Schuster's Star Trek text adventure series begun with *The Kobayashi Alternative, The Promethean Prophecy* places the player as Captain Kirk on the surface of Prometheus Four. With the Enterprise's food supply contaminated, Kirk must solve a series of puzzles in order to unearth the planet's secret prophecy and save his crew from starvation. For the C-64; $32.95.

Simon & Schuster Software, 212-333-5800 (see address list, page 14).

X-15 Alpha Mission follows the player-pilot from takeoff to outer space as he encounters multiple levels of hostile aircraft, ultimately docking with them and destroying a terrorist-controlled space station. For the C-64; $29.95.

Absolute Entertainment, 201-652-1227 (see address list, page 14).

Accolade has launched the Avantage line of mid-priced ($14.95) games, some of which will be new and some acquired from other publishers, with the following:

Spy vs. Spy I & II combines the two volumes based on the Mad magazine series by now-defunct First Star.

Deceptor, an arcade-style adventure game, boasts transformation capabilities via which the hero can transform from land rover to robot to space vehicle.

Desert Fox, acquired from Sydney Development, recreates an actual WWII confrontation between Rommel and the British North African command.

Accolade, Inc., 408-446-5757 (see address list, page 14).

Undercutting Accolade's $14.95 list price is Mindscape's new Thunder Mountain line of C-64 software, selling for $9.95. Also comprising both new and previously released titles, Thunder Mountain's first offering will be *Rambo: First Blood Part II.*

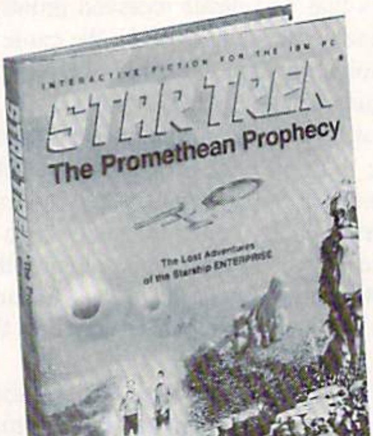
Mindscape, Inc., 312-480-7667 (see address list, page 14).

Drag Race Eliminator ($24.95) simulates five classes of NHRA competition, including Top Fuel Dragster, Top Alcohol Funny Car, and Pro Stock. A split screen view permits use of a detailed timing system with .400 Pro-Start "Xmas Tree" and individual elapsed time clocks, reaction timers, and win lights.

Family Software, 215-497-5561 (see address list, page 14).

From Electronic Arts:

The Official America's Cup Sailing Simulation ($32.95) places the C-64 yachtsman on the actual Perth course, where he uses a joystick to select, raise, and lower sails, navigate the ship, and overlook the entire course as viewed by the helmsman. Details include the sound of the wind as it blows across the course, graphic recreation of calm seas and choppy whitecaps, and a complete instrument panel. Three levels of play are provided: Amateur, Club Race, and America's Cup Challenger.



Save the lives of 420 crewmen.
READER SERVICE NO. 290

Exodus: Ultima III ($59.95) for the Amiga features a newly incorporated window system and other graphic and sound enhancements over the C-64 fantasy role-playing game.

Electronic Arts, 415-571-7171 (see address list, page 14).

Previously released for the Ami-

Software Discounters of America

S.D. of A.

For Orders Only—1-800-225-7638
PA Orders—1-800-223-7784
Customer Service 412-361-5291

- Free shipping on orders over $100 in continental USA
- No surcharge for VISA/MasterCard
- Your card is not charged until we ship

ABACUS BOOKS
C128 Basic 7.0 Internals
C128 Internals CALL
C128 Peeks & Pokes FOR
C128 Tricks & Tips PRICES
CPM 128 User's Guide
1571 Internals
GEOS—Inside & Out

ABACUS SOFTWARE
Assembler Monitor (D) $25
Basic (D) $25
Basic 128 $39
Cad Pak (D) $25
Cad Pak 128 $39
Chart Pak 128 $25
Cobol (D) $25
Cobol 128 $39
Forth (D) $25
Personal Portfolio Manager (D) $25
Power Plan (D) $25
Speed Term 128 $25
Super C (D) $39
Super C 128 $39
Super Pascal (D) $39
Super Pascal 128 $39

ACCESS
Executive Leader Board Tourn. Disk $14
Leader Board Golf (D) $25
Leader Board Tourn. Disk #1 $14
Robotics Workshop Call
Tenth Frame (D) $25
Triple Pack: BH1, BH2, Raid Over Moscow (D) $14

ACCOLADE
Ace of Aces (D) $19
Fight Night (D) $19
Football (D) Call
Hardball (D) $19
Killed Until Dead (D) $19

ACTION SOFT
Thunder Chopper (D) $19
Up Periscope! (D) $19

ACTIVISION
Aliens (D) $23
Cross Country Road Race (D) $19
Gamemaker Library Disks
Sports $14
Science Fiction $14
Gamemaker (D) $25
Greeting Card Maker (D) $23
Hacker 2 (D) $23
Little Computer People (D) $23
Music Studio (D) $23
Portal (D) $25
Shanghai (D) $23
Tass Times (D) $23
Transformers (D) $23

ARTWORX
Beach Blanket Volleyball (D) $9.88
Bridge 4.0 (D) $16
Data Disk #1 Female $14
Data Disk #2 Male $14
Data Disk #3 Female $14
Equestrian Show Jumper (D) $9.88
Highland Games (D) $9.88
Hole in One + 6 (D) $9.88
International Hockey (D) $16
Police Cadet (D) $9.88
Strip Poker (D) $21
Thai Boxing (D) $9.88

AVALON HILL
Super Sunday (D) $21
SBS 1985 Team Disk $14
SBS Champs Disk $14
Spitfire '40 (D) $23
Title Bout (D) $19
Tournament Golf (D) $19

AVANTAGE
Desert Fox (D) $9.88
Deceptor (D) $9.88
Spy vs. Spy 1 & 2 (D) $9.88

BATTERIES INCLUDED
Consultant (64 or 128) $36
Home Pak (D) $14
Paperclip w/Spell (D) $29
Paperclip II 128 $49

BERKELEY SOFTWORKS
Geos 128 Call
Geos 64 (D) $39
*Geo-Calc (D) $33
*Geo-Chart (D) $25
*Geos Desk Pak (D) $23
*Geo-Dex (D) $25
*Geo-File (D) $33
*Geos Font Pak (D) $19

Geos add-on programs only!

BRODERBUND
Bank St. Series Call
Carmen Sandiego (D) $23
Karateka (D) $19
Print Shop (D) $26
P.S. Companion (D) $23
P.S. Graphics Library #1, #2, or #3 $16 Ea.
P.S. Graphics Library Holiday Edition $16
Toy Shop (D) $39

CBS
Body in Focus (D) $23
Mastering the SAT (D) $44
Math Mileage (D) $7
Rich Scarry's Electronic Word Book (D) $12
Sesame St. Pals Around Town (D) $9
Success w/Algebra Call
Success w/Math Call
Timebound (D) $7

CDA
America Cooks Series:
American (D) $9.88
Chinese (D) $9.88
French (D) $9.88
Italian (D) $9.88
Mexican (D) $9.88

CMS
General Acct. 128 $119
Inventory 128 $49

DATA EAST
Commando (D) $23
Kung Fu Master (D) $23
Tag Team Wrestling (D) $23

DATASOFT
Alt. Reality: City (D) $25
Alt. Reality: Dungeon (D) $25
Mercenary (D) $19
Theatre Europe (D) $23

DAVIDSON
Algeblaster (D) $33
Math Blaster (D) $33
Spell It (D) $33
Word Attack (D) $33

ELECTRIC DREAMS
Rocky Horror Show (D) $19
Spindizzy (D) $19
Titanic Recovery Mission (D) $19
Zoids (D) $19

ELECTRONIC ARTS
Software Classic Series:
Archon (D) $9.88
Heart of Africa (D) $9.88
Mail Order Monsters (D) $9.88
M.U.L.E. (D) $9.88
Music Const. Set (D) $9.88
One-on-One (D) $9.88
Pinball Const. Set (D) $9.88
Racing Dest. Set (D) $9.88
Seven Cities Gold (D) $9.88
Super Boulder Dash (D) $9.88
Touchdown Football (D) $9.88

ELECTRONIC ARTS
Adv. Const. Set (D) $26
America's Cup Sailing (D) $23
Amnesia (D) $26
Archon 2: Adept (D) $23
Arctic Fox (D) $23
Balakon Raider (D) $23
Bard's Tale 1 (D) $26
Bard's Tale 2: The Destiny Knight (D) $26
Battlefront (D) $26
Chessmaster 2000 (D) $26
Lords of Conquest (D) $23
Make Your Own Murder Party (D) $23
Marble Madness (D) $23
Movie Maker (D) $23
Scrabble (D) $23
Skyfox (D) $23
Star Fleet I (D) $26
Timothy Leary's Mind Mirror (D) $23
Ultimate Wizard (D) $19

EPYX
Barbie (D) $9
Champ. Wrestling (D) $23
Destroyer (D) $23
Fast Load (R) $23
Gateway to Apshai (D) $9
Impossible Mission (D) $9
Jumpman (D) $9
Movie Monster (D) $23
Multiplan 128 $33
Pitstop II (D) $9
P.S. Graphics Scrapbook 1: Sports (D) $16
P.S. Graphics Scrapbook 2: Off the Wall (D) $16
Summer Games 2 (D) $23
Super Cycle (D) $23
Winter Games (D) $23
World Championship Karate (D) $17.95
World Games (D) $23

FIREBIRD
Elite (D) $19
The Pawn (D) $25

FISHER PRICE
Alpha Build (R) $6.88
Dance Fantasy (R) $6.88
Hop Along Counting (R) $6.88
Linking Logic (R) $6.88
Memory Manor (R) $6.88
Sea Speller (R) $6.88
* Buy 3, get 1 free!

GAMESTAR
Championship Baseball '86 $23
Champ. Basketball (D) $23
Star Rank Boxing (D) $19
GFL Championship Football (D) $23
On-Court Tennis (D) $19

HES
Microsoft Multiplan (D) $19
Project Space Station (D) $19

HI-TECH EXPRESSIONS
Card Ware (D) $6.88
Heart Ware (D) $6.88
Party Ware (D) $9.88

INFOCOM
A Mind Forever Voyaging 128 $23
Ballyhoo (D) $25
Enchanter (D) $23
Hitchhiker's Guide to the Galaxy (D) $23
Leather Goddesses $23
Moonmist (D) $23
Planetfall (D) $23
Sorcerer (D) $25
Suspect (D) $25
Trinity 128 $25
Wishbringer (D) $23
Zork 1 (D) $23
Zork 2 or 3 (D) $25

KONAMI
Yie Ar Kung Fu (D) $19

MASTERTRONIC
Action Biker (D) $6.88
Captain Zap (D) $6.88
Electra Glide (D) $6.88
Infinity Machine (R) $12
5-A-Side Soccer (D) $6.88
Knight Games (D) $6.88
Last V-8 (D) $6.88
Magnum Joystick $12
Master of Magic (D) $6.88
Ninja (D) $6.88
Pro Golf (D) $6.88
Shogun (D) $6.88
Speed King (D) $6.88
The Slugger (D) $6.88
Vegas Poker & Jackpot (D) $6.88

MICROLEAGUE
Baseball (D) $25
Box Score Stats (D) $16
General Manager (D) $25
1985 Team Data Disk $14
1986 Team Data Disk $14
WWF Wrestling (D) $25

MICROPROSE
Acrojet (D) $16
Conflict in Viet Nam (D) $25
Crusade in Europe (D) $25
Decision in Desert (D) $25
F-15 Strike Eagle (D) $23
Gunship (D) $23
Kennedy Approach (D) $16
Silent Service (D) $23
Top Gunner (D) $16

MINDSCAPE
Bop & Wrestle (D) $19
Fairlight (D) $19
High Roller (D) $19
Indoor Sports (D) $19
Infiltrator (D) $19
Perfect College (D) $14
Perfect Score SAT (D) $44
The American Challenge Sailing Simulation (D) $19

MISC
CSM 1541 Align Kit (D) $29
Central Point-Copy 2 (D) $23
Font Master 2 (D) $33
Font Master 2 128 $39
Gato (D) $19
Snapshot 64 (R) $39
Superbase 64 (D) $47
Superbase 128 (D) $59
Superscript 64 (D) $33
Superscript 128 $47

ORIGIN
Autoduel (D) $32
Moebius (D) $26
Ogre (D) $26
Ultima 3 (D) $32
Ultima 4 (D) $39

RELEVANT
Billboard Maker (D) $25
Icon Factory (D) $25

SCARBOROUGH
Build A Book (D) $16
Mastertype (D) $25

SIMON & SCHUSTER
Chem. Lab (D) $25
Great Int'l. Paper Airplane Const. (D) $19
Star Trek: Promethean Prophecy (D) $19
Typing Tutor 3 (D) $25

SPINNAKER
ACE $14
Homework Helper: Math Word Problems $23
Writing $23
Kung Fu 1 or 2 (D) $19 ea.

SPRINGBOARD
Certificate Maker (D) $33
C.M. Library Vol. 1 $23
Newsroom (D) $33
N.R. Clip Art Vol. 1 (D) $19
N.R. Clip Art Vol. 2 (D) $25
N.R. Clip Art Vol. 3 (D) $19
Print Shop Graphics Expander (D) $23

SSI
Battle Group (D) $37
Battle of Antietam (D) $33
Colonial Conquest (D) $25
Gemstone Healer (D) $19
Gettysburg (D) $37
Kampfgruppe (D) $37
Mech Brigade (D) $37
NAM (D) $25
Phantasie (D) $25
Phantasie 2 (D) $25
Rings of Zilfin (D) $25
Roadwar 2000 (D) $25
Shard of Spring (D) $25
War Game Construction Set (D) $19
Warship (D) $39
Wizard's Crown (D) $25

SOFTSYNC
Personal Accountant (D) $23

SUBLOGIC
Baseball (D) $32
Flight Simulator 2 (D) $32
F.S. Scenery Disks Call
Football (D) $26
Jet (D) $26

TELARIUM
Amazon (D) $9.88
Fahrenheit 451 (D) $9.88
Dragon World (D) $9.88
Rendezvous (D) $9.88

THUNDER MOUNTAIN
Cyrus Chess (D) $6.88
Maxi Golf (D) $6.88
Mr. Pixel's Cartoon Kit (D) $6.88
Rambo: First Blood Part II (D) $6.88
The Eliminator (D) $6.88

TIMEWORKS
Accts. Payable (D) $39
Accts. Receivable (D) $39
Data Manager 2 (D) $25
Data Manager 128 $43
General Ledger (D) $39
Inventory Mgmt (D) $39
Partner 64 (R) $39
Partner 128 (R) $43
Swiftcalc/Sideways (D) $25
Swiftcalc/ Sideways 128 $43
Swiftax $33
Sylvia Porter's Personal Fin. Planner (D) 64 $33
Sylvia Porter's Personal Fin. Planner 128 $43
Word Writer w/ Speller (D) $33
Word Writer w/85000 Word Speller 128 $43

UNISON WORLD
Art Gallery 1 (D) $16
Art Gallery 2 (D) $16
Print Master (D) $23

VALUE TIME
Art Library 1 or 2 (D) $9.88
Calendars & Stationery (D) $9.88
Greeting Cards (D) $9.88
Signs & Banners (D) $9.88

WEEKLY READER
Stickybear Series:
ABC's (D) $16
Math (D) $16
Numbers (D) $16
Opposites (D) $16
Reading (D) $16
Shapes (D) $16
Spellgrabber (D) $16
Typing (D) $16

WINDHAM CLASSICS
Alice in Wonderland (D) $6.88
Below the Root (D) $6.88
Swiss Family Robinson (D) $6.88
Treasure Island (D) $6.88
Wizard of Oz (D) $6.88

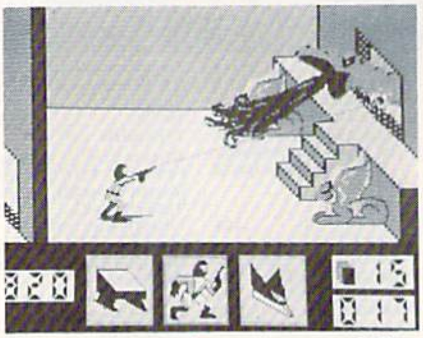
ACCESSORIES
Bonus SS, DD $5.99 Bx
Bonus DS, DD $6.99 Bx
Compuserve Starter Kit (a $25 usage Credit) $19
Disk Case (Holds 75) $9
Disk Drive Cleaner $9
Dow Jones Starter Kit $9.88
Epyx 500XJ Joystick $14
Wico Bat Handle $17

P.O. BOX 111327—DEPT. AY—BLAWNOX, PA 15238

*Please Read The Following Ordering Terms & Conditions Carefully Before Placing Your Order: Orders with cashiers check or money order shipped immediately. Personal & Company checks, allow 3 weeks clearance. No C.O.D.'s! *Shipping: Continental U.S.A.*—Orders under $100 add $3; *free shipping on orders over $100. AK, HI, FPO, APO—add $5 on all orders. Canada & Puerto Rico—add $10 on all orders.* Sorry, no other International orders accepted! *PA residents add 6% sales tax on the total amount of order including shipping charges!* Prices subject to change without notice. *REASONS FOR CALLING CUSTOMER SERVICE*—412-361-5291 (1) Status of order or back order (2) If any merchandise purchased within 60 days from S.D. of A. is defective, please call for a return authorization number. Defective merchandise will be replaced with the same merchandise only. NO CREDITS! After 60 days please refer to the manufacturers warranty included with the merchandise & return directly to the manufacturer. *Customer service will not accept collect calls or calls on S.D. OF A.'s 800# order lines! REGULAR HOURS: Mon.-Fri. 9AM-5:30 PM, Sat. 10AM-4PM Eastern Time.* Have you seen our on line catalog of 1000 software titles for Commodore, Atari, Apple, IBM and Amiga? It's on Compuserve Electronic Mall—just type GO SDA and shopping for software will never be the same again!

ga, *Diablo* for the C-64 ($29.95) requires the player to manipulate 240 convoluted sections of track to keep a moving ball on a continuous course.

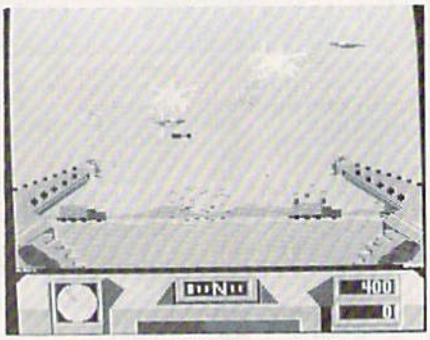
Classic Image, 609-667-2526 (see address list, page 14).



Deceptor: ***transformation capability.***
READER SERVICE NO. 291

More details on Activision's *Howard the Duck—Adventure on Volcano Island* ($34.95), preannounced in January's *Scuttlebutt*: the game follows the fowl on his quest to rescue his friends from an evil overlord. He employs the ancient art of Quack-Fu to vanquish numerous foes and make his way to the volcano's crater to halt its impending eruption.

Activision, 415-960-0410 (see address list, page 14).



Desert Fox: ***WWII hunt for Rommel.***
READER SERVICE NO. 292

EPROM STORAGE

ROMdisk with Hyperboot ($179.00) allows the C-64 owner to place up to 150 programs on a 128K EPROM bank attached to the user port. The *Hyperboot* software, supplied on an 8K cartridge, permits the transfer of files from a 1541. Once on the *ROMdisk*, files will load at a rate of 63 blocks per second. The EPROM can be erased via ultraviolet light and reprogrammed thousands of times. Also available: two-way switches that allow a modem and the *ROMdisk* to share the user port ($39), and 3 foot ribbon wire extension cables to allow remote placement of the *ROMdisk* or a modem ($24.95).

Epimetheus Corporation, 812-336-4508 (see address list, page 14).

NEW LEASH ON LIFE

Every now and then we have the pleasure of informing the diehard VIC 20 and Plus/4 users in our reading audience of new releases for those machines. But you could have knocked us over with a quill pen when we learned recently of new software for the PET 8032. Byteware has just adapted their *Genealogist* software package for the PET series, in both 4040 and 8050 format. A stamped, self-addressed envelope will get you information, sample sheets, and prices (starting at $9.95) for various genealogy programs (also available for the 64, 128, and Plus/4).

Byteware (see address list, page 14).

GOTO MARKET

An enhancement of the C-64 version, *Technical Analysis System 128* ($59.95) offers comprehensive stock charting and analysis. The investor can update his portfolio manually or automatically through Dow Jones News/Retrieval Service of Warner Computer Service. *TAS-128* then draws a selection of charts and graphs that help him determine the right time to buy and sell stocks and bonds.

Abacus Software, 616-241-5510 (see address list, page 14).

GRAPHICS CONVERTER

Graphics Converter ($19.95) makes it possible to use *Print Shop* graphics with *Print Master,* and *Print Master* graphics with *Print Shop.* Features include HELP screen, directory listing, and two automatic conversion modes, single file or entire disk. One

or two drives can be used, and both the 1541 and 1571 are supported.

Cardinal Software, 703-491-6494 (see address list, page 14).

AMIGA EXPANDER

Announced too late for inclusion in last month's feature on Amiga RAM expansion, the MegaBoard ($599.95) 2 meg expander fits next to the Amiga without intruding on work space. The board was developed using advanced "programmable array logic" and zip package 256K dynamic RAM technology, making possible a decrease in product size and chip technology.

Progressive Peripherals & Software, 303-825-4144 (see address list, page 14).

MORE CERTIFICATES

Certificate Library Volume I ($34.95) provides owners of Springboard's *Certificate Maker* for the C-64 with over 100 new predesigned certificates and awards such as "Home Improvement Survivor" and "Best Dancer," 24 new borders, and six dozen new seals and stickers.

Springboard Software, Inc., 612-944-3915 (see address list, page 14).

CAR LEASING DISK

We did it first, with *Autos: Leasing v. Buying?* in the July '85 *Ahoy!* And now Lincoln-Mercury has developed a diskette providing consumers with an indepth look at the advantages of car leasing, along with complete specifications and sample lease/purchase comparisons for the new Lincoln-Mercury and Merkur XR4Ti models. The disk is available free by calling or writing: specify Commodore (or IBM, Mac, or DEC) format.

Lease Program Headquarters, 800-922-9073 (see address list, page 14).

128 DISK UTILITY

The *Peek A Byte 128* disk and memory utility has all the features of the C-64 original, plus the ability to read or write to a 1571 double sided disk, convert 1541 single sided to 1571 double sided format, and display in 80 columns. Owners of *Peek A Byte 64* can upgrade for $20, for which they also receive *Peek A Byte 64 V2.0* and a new manual.

Quantum Software (see address list, page 14).

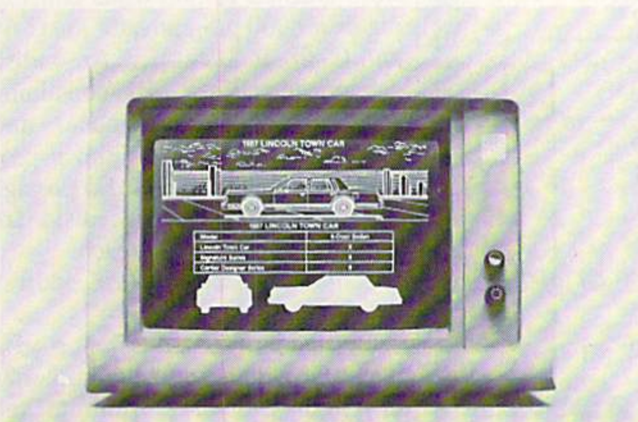
PERSPECTIVE PROGRAM

Building Perspective is what students from grade 4 up will be doing as they view a group of buildings of different heights from ground level, then predict how those buildings would appear if viewed from above. Students must take notes and carefully compile information to succeed. Price of the C-64 disk, backup, and teacher's guide is $59.00.

Sunburst Communications, 800-431-1934 (see address list, page 14).

BOOKS

The Complete Commodore Machine Code Programming Guide ($19.95) introduces the reader to hex and binary numbering, labels, branching, and flags, logic tables, bit manipulations, using the Kernal, and more. An assembler compatible with



Featuring color graphic illustrations of all Lincoln-Mercury models, this free diskette compares relative merits of leasing v. buying.
READER SERVICE NO. 293

what's written in the text is provided as a listing.

Methuen, 212-244-3336 (see address list, page 14).

Universal Assembly Language ($18.95 paper, $27.95 hardbound) isn't quite–but it is applicable to the Amiga among other (non-Commodore) machines. Included is information on writing programs, use of compact code, subroutines, complex math operations, and advanced features.

TAB Books Inc., 717-794-2191 (see address list, page 14).

Understanding Advanced Solid State Electronics ($14.95) covers IC technology for the experimenter, serious hobbyist, and electronics technician. Beginning with a review of logic circuits, the volume continues on to digital signal processing, bit-slice systems, graphics processors, and other topics.

Howard W. Sams & Co. (see address list, page 14).



Self-paced IC and logic instruction.
READER SERVICE NO. 294

AMIGA SIDECAR

Commodore displayed a working model of its Sidecar IBM PC hardware emulator at December's World of Commodore exhibition. The unit consists of an Amiga interface and an 8088 subsystem running at 4.77 MHz. Both parts, plus power supply, 5¼" drive, and (optional) 20 MB hard disk, are contained in an outboard housing that connects to the Amiga bus expansion slot. The emulator provides 256K of RAM, expandable to 512K. All PC video modes are supported in real-time, and monochrome/Alpha and Color Graphics modes can be displayed simultaneously in different windows. Suggested list price is $1495.00.

Commodore International, 215-431-9100 (see address list, page 14).

PUBLIC OPINION

An outstanding value in public domain programs is offered by Schneider Software, whose line of *Frugalware* consists of 300 disks containing over 8000 programs for the C-64 and C-128 at $2.50 per. An ondisk catalog and a free disk containing word processor, database, and spreadsheet plus 30 additional programs can be had for $2.00 postage and handling. 25 Amiga disks are also available at $4.95 each.

Schneider Software (see address list, page 14).

Outstanding for a different reason is the Folklife Terminal Club's offer of free disks of PD software for the

64, 128, Plus/4, VIC 20, PET, and B-128 computers. The software is free, their press release explains—but there is a copying and mailing fee of $15 per diskette. Seems to us we once heard a joke along those lines—something about the coffee being free, but rental on the cup and saucer being $2.00.

Folklife Terminal Club (see address list, page 14).

AMIGA HARD DRIVES

Two more hard disk systems for the Amiga:

SupraDrive includes a hard disk system, real-time clock with battery backup, SCSI expansion port, and the capability to expand the Amiga's RAM via plug-in modules offering from 512K to 4 MB. The system's own proprietary interface makes possible burst data transfers of over 250K per second. SupraDrive is available in 20 ($995), 30 ($1195), and 60 ($1995) megabyte versions.

Supra Corporation, 503-967-9075 (see address list, page 14).

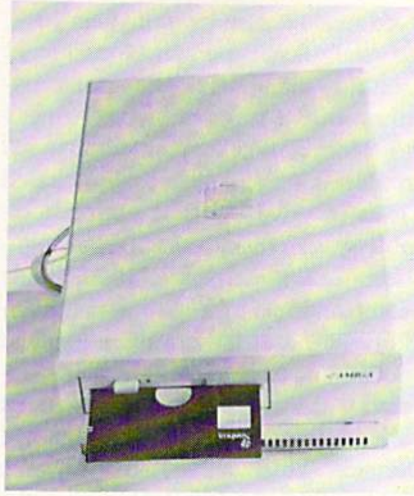
The C Ltd Hard Drive for the Amiga ($995) offers full AutoConfig SCSI controller (all 20 MB conforms to standard Commodore/Amiga protocol), internal power supply, and full pass-through out of the expansion port. The controller will support up to seven SCSI devices (tape backups, CD-ROMs, etc.).

C Ltd, 316-267-6321 (see address list, page 14).

AMIGA LASER UTILITY

JetSet ($69.95) allows Amiga users access to laser printers, making available hundreds of fonts for downloading to a Hewlett-Packard LaserJet Plus or compatible. The package's *Textcraft/Scribble Utility* permits the use of up to three fonts on any document created with the two most popular Amiga word processors; *LaserJet Command Set* makes it possible to communicate with the LaserJet without complicated jargon; and *Text Formatter* reads special imbedded commands in any standard ASCII file created by the user with standard text editor. The program also allows creation of files for transfer to laser printer equipped MS-DOS computers.

C Ltd, 316-267-6321 (see address list, page 14).



Sidecar: IBM emulation for Amiga. READER SERVICE NO. 295

COMPILER UPGRADE

The new Version 3.10 of Lattice's *AmigaDOS C Compiler* features increased library modularity and new addressing modes that help reduce



SupraDrive plugs into the Amiga's expansion connector to provide a hard drive, SCSI expansion port, expansion capability, real-time clock. READER SERVICE NO. 296

load module sizes by more than 20%, as well faster pointer and integer math, faster IEEE floating point routines, direct support of the Amiga's FFP format floating point library, and multitasking support. Also included are a two-disk package with a bootable system disk to simplify installation, full macro assembler, single command line execution of compiler, librarian, and linker, and expanded documentation. The compiler bundled with Lattice's Text Management Utilities is $225; the Professional version which adds Lattice's Make Utility and Screen Editor and the Metadigm MetaScope Debugger is $375. Version 3.10 owners can upgrade for $75 ($225 for the Professional version).

Lattice, Inc., 312-858-7950 (see address list, below).

TAX PROGRAMS

Based on the Tax Reform Act of 1986, *Future-Tax* automatically computes the new standard deduction, exemptions, limitations on IRA contributions, the new surtax, capital gain tax phase in, and the new itemized deduction limitations. On disk for the C-128, C-64, or Plus/4; $34.95.

Northland Accounting, Inc., 218-834-3600 (see address list, below).

The Tax Advantage ($59.95), published for the past five years by Continental Software/Arrays, Inc., will henceforth be sold by Double Eagle Software. The Commodore revision for tax year 1986 supports IRS Form 1040, Schedules A-E, G, SE, and W, and Forms 2106, 2441, 4562, and 6251, including income averaging, depreciation, and the alternative minimum tax. Form 1040 can be printed directly on the IRS forms or in draft; all other forms and schedules can be printed in IRS-approved formats.

Double Eagle Software, 213-459-9748 (see address list, below).

Companies Mentioned in Scuttlebutt

Abacus Software
P.O. Box 7219
Grand Rapids, MI 49510
Phone: 616-241-5510

Absolute Entertainment
P.O. Box 287
Midland Park, NJ 07432
Phone: 201-652-1227

Accolade
20833 Stevens Creek Blvd.
Cupertino, CA 95014
Phone: 408-446-5757

Activision, Inc.
2350 Bayshore Parkway
Mountain View, CA 94043
Phone: 415-960-0410

Byteware
Maple City Software
906 West 6th Avenue
Monmouth, IL 61462

C Ltd
723 East Skinner
Wichita, KS 67211
Phone: 316-267-6321

Cardinal Software
14840 Build America Drive
Woodbridge, VA 22191
Phone: 703-491-6494

Classic Image, Inc.
510 Rhode Island Avenue
Cherry Hill, NJ 08002
Phone: 609-667-2526

Commodore International
1200 Wilson Drive
West Chester, PA 19380
Phone: 215-431-9100

Double Eagle Software
2210 Wilshire Blvd., Ste. 875
Santa Monica, CA 90403
Phone: 213-459-9748

Electronic Arts
1820 Gateway Drive
San Mateo, CA 94404
Phone: 415-571-7171

Epimetheus Corporation
P.O. Box 171
Clear Creek, IN 47426
Phone: 812-336-4508

Family Software
3164 Surrey Lane
Aston, PA 19014
Phone: 215-497-5561

Folklife Terminal Club
Box 555-PH
Co-op City Station
Bronx, NY 10475

Howard W. Sams & Co.
4300 W. 62nd Street
Indianapolis, IN 46268

Lattice, Inc.
P.O. Box 3072
Glen Ellyn, IL 60138
Phone: 312-858-7950

Lease Program Hdqtrs.
P.O. Box 2909
Farmington Hills, MI 48018
Phone: 800-922-9073

Methuen
29 West 35th Street
New York, NY 10001
Phone: 212-244-3336

Mindscape, Inc.
3444 Dundee Road
Northbrook, IL 60062
Phone: 312-480-7667

Northland Accounting, Inc.
606 Second Avenue
Two Harbors, MN 55616
Phone: 218-834-3600

Quantum Software
P.O. Box 12716
Lake Park, FL 33403

Schneider Software
23 East Green Street
West Hazleton, PA 18201

Simon & Schuster Software
Gulf+Western Building
One Gulf+Western Plaza
New York, NY 10023
Phone: 212-333-3397

Springboard Software, Inc.
7808 Creekridge Circle
Minneapolis, MN 55435
Phone: 612-944-3915

Sunburst Communications
39 Washington Avenue
Pleasantville, NY 10570
Phone: 914-769-5030

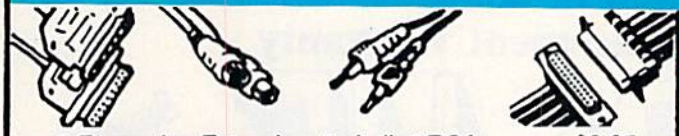
Suncom Incorporated
260 Holbrook Drive
Wheeling, IL 60090
Phone: 312-459-8000

Supra Corporation
1133 Commercial Way
Albany, OR 97321
Phone: 503-967-9075

Tab Books, Inc.
Blue Ridge Summit, PA
Phone: 717-794-2191

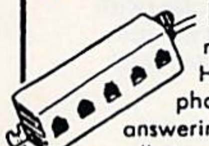
Timeworks
444 Lake Cook Road
Deerfield, IL 60015
Phone: 312-948-9200

CABLES & ACCESSORIES



6 Ft. monitor Extension, 5 pindin/2RCA	$8.95
6 Ft. monitor Extension, 5 pindin/3RCA	$8.95
6 Ft. monitor Extension, 5 pindin/4RCA	$9.95
6 Ft. 6 Pindin Male/Male	$6.95
9 Ft. 6 Pindin Male/Male	$8.95
18 Ft. 6 Pindin Male/Male	$16.95
6 Ft. 6 Pindin Male/Male	$6.95
6 Ft. Centronics, Male/Male	$14.95
6 Ft. Centronics, Male/Female	$14.95
6 Ft. RS232, 25 Pin, Male/Female	$14.95
9 Ft. 6 Pindin, Male Rt. Angle/Male	$9.95
12 Ft. Joystick Extension	$8.95
6 Ft. 90° Angle 1541 Powercord	$9.95
7 Ft. Modem Extension Cord (Plug-Plug)	$3.95
15 Ft. Modem Extension Cord (Plug-Plug)	$5.95
25 Ft. Modem Extension Cord (Plug-Plug)	$6.95
Handy Fuse Puller	$1.95
IC Puller (No more poked fingers)	$4.95
Hi-Res Stereo Headphones (CD ready, Gold contacts)	$8.95
Save your Joystick Ports from damage with this Port Extender	$6.95

5 TERMINAL PHONE EXPANDER



No more unplugging. Hook up modems, phones, auto dialers answering machines, etc. all at once! **$14.95**

128 CABLE

80 column on the C128 with the 1701/1702 monitor monochrome w/sound. Save big money. **$9.95**

C128 Reference Book $15.95

Over 75 easy to read charts and tables. 261 pgs. of solid information. Not one wasted page. Lays flat for easy reading. Color coded, always find what you need. An incredible compilation of information. Guaranteed.

Protection Revealed Book $19.95

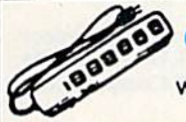


Learn to protect and unprotect your software. For the new user, and experimenter. Includes basic program security. FREE disk included. (21 Utilities)

Disk Cleaner $8.95



6 OUTLET STRIP



Why pay more? These units have a 15 AMP breaker illuminated switch and heavy duty cord. **ONLY $11.95**

2764 E PROMS

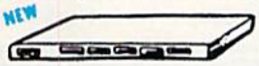


These are the ones! The chips you want, at a price you love. **$5.95**

The ULTRAVOX MASTER SYSTEM

Includes: one ULTRAVOX two speakers 1 headphones **only $59.95**

Quality POWER CENTER



EMI FILTERING NEW
15 AMP Breaker
Surge Protection
Lighted Rocker Switches
Master ON/OFF Switch
Heavy Metal Case

Includes a switch for computer, monitor, printer, Aux 1, Aux 2.
Please add $5.00 S&H for this item. **$59.95**

HARDWARE & SOFTWARE

RS232 Jumper Box

Reconfigure your RS232 port. Fix mismatched cables. Plug type. **$19.95**

RS232 Gender Changer

Change your port either way. Male/Male **$8.95** Fem/Fem **$8.95**

RS232 Port Minitester

Diagnose RS232 communication problems. 7 LED Lights. **$19.95**

The ULTRAVOX Sound System

This system adds an exciting new dimension to all of your sound producing software! 100% stereo sound from your Commodore 64. It even has a built-in amp to power speakers directly.

- No soldering
- 100% External hardware
- Also works on VCR & TV

was $49.95 now **$39.95**

RS232 BREAKOUT BOX

No batteries required, uses power from RS232 signal. 2 color LED's. Reconfigure or solve RS232 problems. Comes with a DB25 Male and DB25 Female.

$49.95

DI-SECTOR (Latest Version)

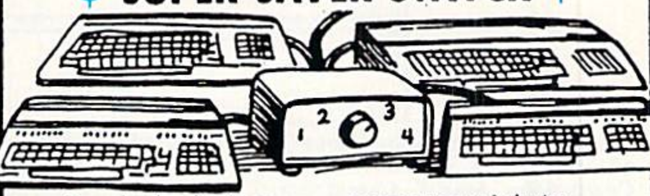
Di-sect all of the latest software, make archival backups of the hard-to-get stuff. This is so much more than a copy program! It has all the copiers you want, plus an incredible file copier, ML monitor, sector editor, etc. Plus a parameter copier with over 140 parameters.

Entire Utility System **only $39.95**

$ SAVER SWITCH $

Connects two computers to one printer or disk drive, or share your drive and printer between two computers. Link two printers to one computer. Switch from one device to another.
Mod. 1: Two 6 pindin female sockets and 4' cable
Mod. 2: Three 6 pindin female sockets; can be used with most printer interfaces. **$29.95**

$ SUPER SAVER SWITCH $



For school or business. 4 computers to 1 device **$79.95**

PARALLEL A/B SWITCH

36 pins switched, female connectors, gold contacts, high-quality push-button switch.

$44.95

RS232 A/B SWITCH

25 pins switched, DB 25 connectors, high-quality push-button switch.

$44.95

PRECISION PERIPHERALS & SOFTWARE Call TODAY!

P.O. Box 20395
Portland, Ore. 97220

DEALERS and SCHOOLS WELCOME
Add $2.00 shipping & handling. VISA, M.C.

503/254-7855

SALE • *Famous National Brand* • SAVE

Price Break Thru

Hi-Speed Printer Sale

•160 - 180 CPS • Near Letter Quality •

Near Letter Quality Selectable From Front Panel Controls • High Speed Dot Matrix• Letter Quality Modes • 8K Buffer frees up computer 4-times faster • Pica, Elite, Italics, Condensed • Super Graphics • Business or Personal • Tractor/Friction • 15 Day Free Trial • Lifetime Warranty on Print Head* • 6 Month Immediate Replacement Warranty •



10'' Carriage

Fantastic Graphics

Lifetime Warranty*

N.L.Q. 180 Printer

SAVE OVER 60%

SALE

$199.00

List $499.95

Fantastic Price

Below Wholesale Cost Prices!!!

Print Sample

```
This is an example of ITALICS
Enhanced          Boldface
Condensed Text    Double-strike
example of Near Letter Quality
```

— APPLE — ATARI — EPSON — NLQ180 SPECIFICATIONS — IBM — COMMODORE — ETC. —

Print Buffer
8K bytes utility buffer

Printing Direction
Text Mode — Bi-directional
Graphic Mode — Uni-directional

Interface
Centronics type parallel (8-bit)

Paper
Plain paper, Roll paper, Single sheet
Fanfold, Multipart paper: max. 3 sheets (original plus 2 copies)

Character Fonts
Pica, Elite, Italics, Condensed

Printing Method
Impact dot matrix

Printing Speed
160-180 CPS at standard character printing

Printing Characters
Standard 9 x 9 dot matrix
NLQ 12 x 18 dot matrix
Character size: 2.12 x 2.8 mm (standard)
Character sets: Full ASCII character set (96)
32 International characters

Ink Ribbon Cartridge
Ribbon Life: 3 million characters/cartridge

Physical Dimensions
Size: 15'' x 12'' x 5''
Weight: 12.7 lbs.

Maximum Number of Characters

Standard:	10 cpi	80 cpl
Standard enlarged:	5 cpi	40 cpl
Elite:	12 cpi	96 cpl
Elite enlarged:	6 cpi	48 cpl
Condensed:	17 cpi	132 cpl
Condensed enlarged:	8.5 cpi	66 cpl
Condensed elite:	20 cpi	160 cpl

INTERFACES

Atari $39.00 Apple $49.00 Commodore $29.95 IBM $49.00 Laser $19.95

Add $10.00 for shipping, handling, and insurance. Illinois residents please add 6½% sales tax. Add 20.00 for CANADA, PUERTO RICO, HAWAII, ALASKA, APO-FPO orders. All orders must be in U.S. Dollars. WE DO NOT EXPORT TO OTHER COUNTRIES EXCEPT CANADA. Enclose Cashier Check, Money Order or Personal Check. Allow 14 days for delivery, 2 to 7 days for phone orders, 1 day express mail. Prices & Availability subject to change without notice.

VISA — MASTER CARD — C.O.D. C.O.D. on phone orders only.

PROTECTO

We Love Our Customers

22292 N. Pepper Rd., Barrington, Illinois 60010

312/382-5244 to order

Reader Service No. 277

PROTECTO ENTERPRIZES

"The Computer Experts"

22292 N. Pepper Rd., Barrington IL 60010

• OUR WARRANTY •

All our products carry a minimum 90 day warranty from the date of purchase. If problems arise, simply send your product to us via U.P.S. prepaid. We will IMMEDIATELY send you a replacement at no charge via U.P.S. prepaid. This warranty proves once again that... *We Love Our Customers!*

COMMODORE 64c

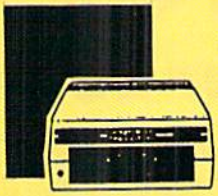


Includes the GEOS program.

SALE $ **159.95**

List $299

1541 DISK DRIVE



SALE $ **179.95**

List $249

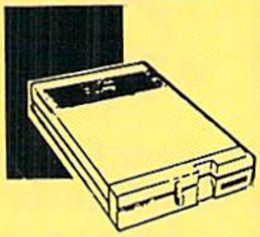
COMMODORE 128



SALE $ **299.00**

List $399

1571 DISK DRIVE



SALE $ **259.00**

List $349

BIG BLUE PRINTER



This is the affordable printer you've waited for! 8½" letter size, 80 column dot matrix, heat transfer printer features upper and lower case, underline, graphics, word processing, and much more.

SALE $ **39.95**

List $199

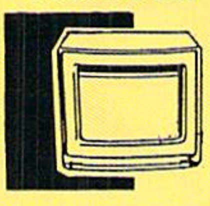
PRINTER & TYPEWRITER COMBINATION

Superb Silver Reed letter quality daisy wheel printer/typewriter, just a flick of the switch to interchange. Extra large carriage, typewriter keyboard, automatic margin control, compact, lightweight, drop in cassette ribbon! Includes Centronics Parrallel Interface

SALE $ **199.95**

List $299

14" COLOR MONITOR



High Resolution, clear screen, 40 col. x 24 lines. Audio hookup. One year Ltd. warranty.

SALE $ **139.95**

List $329

TV TUNER

Now switch your computer monitor into a television set with the flick of a switch. This Tuner has dual UHF/VHF selector switches, mute, automatic fine tuning and computer/TV selector switches. Hooks up between your computer and monitor! Inputs included for 300 ohm, 75 ohm, and UHF.

SALE $ **49.95**

List $130

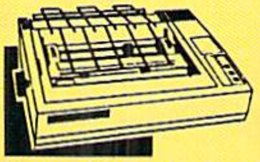
150-170 CPS COMSTAR AERO 160 PRINTER

The Comstar Aero 160 has a 10" carriage, 9x9 dot matrix with double strike capability for 18x18 dot matrix (near letter quality), high resolution bit image (120x144 dot matrix), underline, back spacing, left and right margin setting, true lower descenders with super/subscripts, prints standard, block graphics and special characters. Same features as printers costing twice as much! (Centronics Parrallel Interface)

SALE $ **199.00**

List $499

COMSTAR 1000 PRINTER

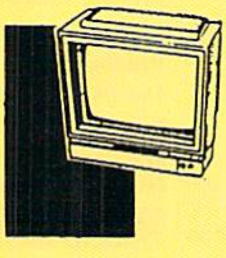


Print letters, documents, ect., at 100 cps. Works in Near Letter Quality mode. Features are dot addressable graphics, adjustable tractor and friction feed, margin settings, pica, elite, condensed, italics, super/subscript, underline, & more. Interface Included.

SALE $ **179.95**

List $349

12" 80 COLUMN MONITOR

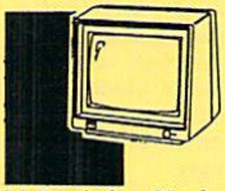


High Resolution green screen monitor. 80 col. x 24 lines.

SALE $ **89.95**

List $129

14" RGB & COMPOSITE COLOR MONITOR



High Resolution, 80 column Monitor. Switch from RGB to Composite. (C128 - IBM -Apple) RGB cable $19.95. Add $14.50 shipping.

SALE $ **237.00**

List $399

MasterCard

TO ORDER CALL (312) 382-5244

8 am - 8 pm CST Weekdays / 9 am - 12 noon CST Saturdays

VISA

BEST SERVICE IN THE USA • ONE DAY EXPRESS MAIL • 15 DAY FREE TRIAL • VOLUME DISCOUNTS • OVER 500 PROGRAMS • CUSTOMER LIST OF OVER 3,000,000 - LARGEST IN THE USA

FOR FREE CATALOG CALL

(312) 382-5244

CALL BEFORE YOU ORDER: PRICES MAY BE LOWER & WE OFFER SPECIAL SYSTEM DEALS

MUSICAL KEYBOARD

This sturdy 40 key professional guage spring loaded keyboard gives the feel and response of a real keyboard instrument. (Conductor software required)

SALE $69.00

List $159.95

1200 BAUD MODEM

Save time and money with this 1200 Baud modem. It has many features you expect a modem to have plus 4 times the speed!

SALE $79.95

List $199

COMPUTER CLEANERS

TV/Monitor Screen Restorer & Cleaning Kit, Disk Drive Cleaner, Anti-Static Keyboard Cleaner

*Choose any of these three computer cleaners for only $9.95 each!

SALE $9.95*

List $19.95

SUPER AUTO DIAL MODEM



Features on-line clock, dialing from keyboard, capture and display high resolution characters, and much more.

SALE $29.95

List $99

SINGLE SIDED DOUBLE DENSITY DISKS

100% Certified 5¼" floppy disks. **Lifetime Warranty.** 1 Box of 100 $29.00 List $1.99 each

.29¢ ea.

SPECIAL BONUS COUPON

We pack a special software discount coupon with every Computer, Disk Drive, Printer, or Monitor we sell! This coupon allows you to **SAVE OVER $250** off sale prices!

(EXAMPLES)

Name	List	Sale	Coupon
B. I. Homepak	$49.95	$19.95	*$17.95*
Super Huey II	$19.95	$12.95	*$11.95*
Flight Control Joystick	$19.95	$12.95	*$10.00*
Newsroom	$49.95	$32.95	*$29.95*
Leader Board	$39.95	$23.95	*$22.95*
TV Tuner	$99.95	$49.95	*$39.95*
Commando	$34.95	$21.95	*$21.95*
Create with Garfield	$29.95	$16.95	*$14.95*
Geos	$59.95	$39.95	*$37.95*
SAT The Perfect Score	$69.95	$42.95	*$39.95*
World Games	$39.95	$24.95	*$22.95*
Trinity	$34.95	$24.95	*$22.95*
C128 Partner	$69.95	$49.95	*$44.95*
Robotics Workshop	$149.95	$124.95	*$114.95*
C128 Programmers Reference Guide	$21.95	$12.95	*$ 9.95*

(See over 100 coupon items in our catalog.)

ACCESS

ACTION PACK (D) $19.95
LEADER BOARD (D) 23.95
LEADER BOARD COURSES (D) ... 13.95
MACH 5 (C) 19.95
MACH 128 (C) 28.95
TENTH FRAME (D) 23.95

ACCOLADE

ACE OF ACES (D) $18.95
DAM BUSTERS (D) 18.95
FIGHT NIGHT (D) 18.95
HARDBALL (D) 18.95
LAW OF THE WEST (D) 18.95
KILLED UNTIL DEAD (D) 18.95

BLUE CHIP

BARON (D) $14.95
MILLIONAIRE (D) 14.95
TYCOON (D) 14.95

BCI

TOM WEISKOPF PRO GOLF (D) $11.95
MR. TESTER (D) 5.95
PRINTERS LIB. 1 (D) 8.95
PRINTERS LIB. 2 (D) 8.95
DATABASE MGR./PLUS - C128 (D) 14.95
TASK FORCE (D) 4.95

BRODERBUND

PRINT SHOP (D) $25,95
GRAPHICS LIB. 1,2 or 3 (D) 15.95
COMPANION (D) 22.95
TOY SHOP (D) 38.95
WHERE IS CARMEN SANDIEGO (D) 21.95
GRAPHICS LIB. HOLIDAY ED. (D) 15.95

ELECTRONIC ARTS

HEART OF AFRICA (D) $9.95
ONE ON ONE (D) 9.95
PINBALL CONTRUCTION (D) 9.95
MUSIC CONSTRUCTION (D) 9.95
RACING DESTRUCTION (D) 9.95
MARBLE MADNESS (D) 22.95
CHESSMASTER (D) 25.95
BATTLEFRONT (D) 25.95
LORDS OF CONQUEST (D) 22.95

DATA SOFT

221 B BAKER STREET (D) $17.95
MERCENARY (D) 17.95
NEVER ENDING STORY (D) 17.95
MIND PURSUIT (D) 17.95
VIDEO TITLE SHOP (D) 17.95
THEATRE EUROPE (D) 19.95

DESIGNWARE

BODY TRANSPARENT (D) $24.95
EUROPEAN NATIONS & LOCATIONS (D) . 22.95
STATES AND TRAITS (D) 22.95

HAYDEN

SARGON II (D) $9.95
SAT VERBAL (D) 14.95
SAT MATH (D) 14.95
SAT PRATICE TEST (D) 14.95

COSMI

SUPER HUEY II (D) $12.95
TALLADEGA (D) 10.95
BEYOND FORBIDDEN FOREST (D) 10.95

DATA EAST

COMMANDO (D) $22.95
KARATE CHAMP (D) 22.95
KUNG FU MASTER (D) 22.95

EPYX

CHAMPIONSHIP WRESTLING (D) $22.95
FAST LOAD (C) 22.95
MOVIE MONSTER (D) 22.95
WINTER GAMES (D) 22.95
WORLD GAMES (D) 22.95
WORLD KARATE (D) 16.95
WORLD'S GREATEST FOOTBALL (D) 22.95

FIREBIRD

COLOSSUS CHESS (D) $20.95
ELITE 64 (D) 18.95
FRANKIE GOES TO HOLLYWOOD (D) 19.95
BATTLE OF BRITAIN/MIDWAY (D) 9.95
IWO JIMA/FAULKLANDS (D) 9.95
TALKING TEACHER (D) 22.95

HI-TECH EXPRESSIONS

CARD WARE (D) $6.95
HEART WARE (D) 9.95
PARTY WARE(D) 9.95
WARE WITH ALL KIT (D) 9.95
HOLIDAY PRINT PAPER (D) 7.95

SUB—LOGIC

FLIGHT SIMULATOR II (D) $31.95
JET (D) 25.95
FOOTBALL (D) 25.95
BASEBALL (D) 31.95

S.S.I.

ROADWAR 2000 (D) $23.95
BATTLE OF ANTIETAM (D) 31.95
GETTYSBURG (D) 32.95
MECH BRIGADE (D) 32.95
NAM (D) 23.95
U.S.A.A.F. (D) 32.95
KAMPFGRUPPE (D) 32.95
WAR SHIP (D) 32.95

SOFTSYNC

ACCOUNTANT, INC. C128 (D) $59.95
DESK MANAGER (D) 24.95
KID PRO QUO (D) 19.95
MODEL DIET (D) 19.95
TRIO C64 (D) 29.95

SPINNAKER

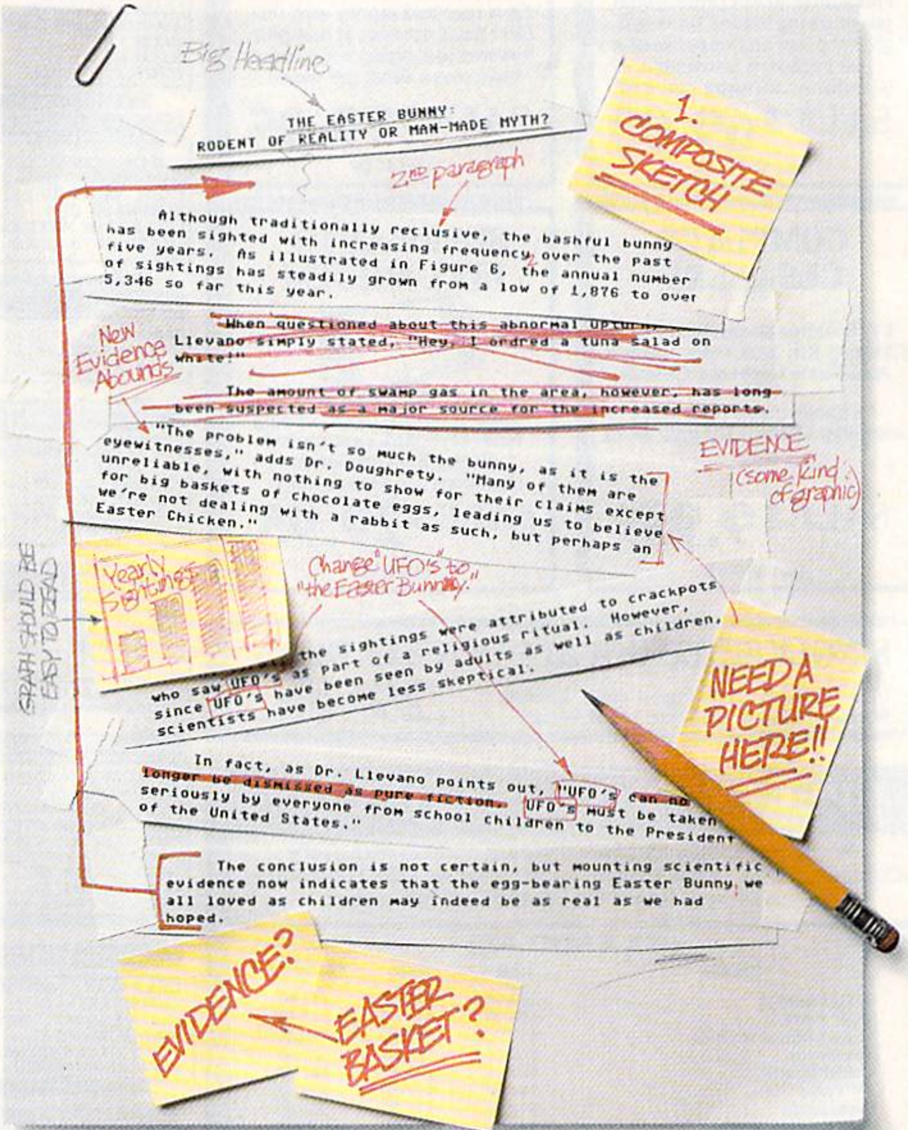
DELTA DRAWING (C) $9.95
NUMBER TUMBLERS (C) 9.95
SEA SPELLER (C) 9.95
UP & ADD'EM (C) 9.95

Add $3.00 ($10.00 for hardware) for shipping, handling, and insurance. Illinois residents please add 6½% sales tax. Add $6.00 ($20.00 for hardware) for CANADA, PUERTO RICO, HAWAII, ALASKA, APO-FPO orders. All orders must be in U.S. Dollars. WE DO NOT EXPORT TO OTHER COUNTRIES EXCEPT CANADA. Enclose Cashier Check, Money Order or Personal Check. Allow 14 days for delivery, 2 to 7 days for phone orders, 1 day express mail. Prices & Availability subject to change without notice. Hardware shipping prices vary according to weight. Please call for amount. No APO-FPO for Monitors.

VISA-MASTER CARD-C.O.D. C.O.D. on phone orders only.

Reader Service No. 277

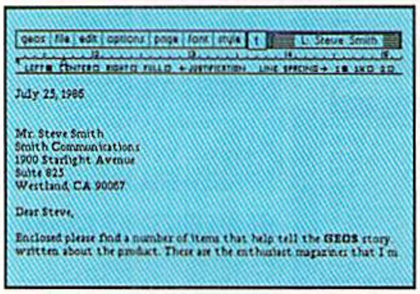
THE STRON
ARE BUILT WIT



Whether you're building an argument or just hammering out a memo, any project looks better when you put it together in Writer's Workshop. The supercharger that powers your GEOS-equipped Commodore through even the most wrenching assignments.

Sharpen your skills. The first thing to do in the Workshop is plug into geoWrite 2.0, which contains all the brand new tools you need to hone any rough concept into a well-crafted document.

You get headers. Footers. Subscripts and superscripts. You can center your text. Right justify. Full justify. And nail



down formatting problems with variable vertical spacing and adjustable margins.

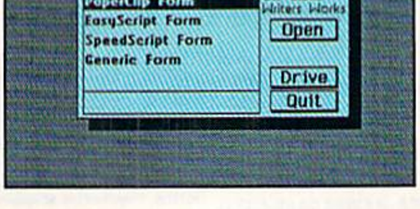
The Workshop cuts down on your manual labor, too. With one-stroke, "shortcut" keyboard commands. They keep your hands off the mouse so you can keep your mind on your work.

In fact, there's a complete set of heavy-duty accessories that not only strengthen your writing, but reinforce its structure, as well.

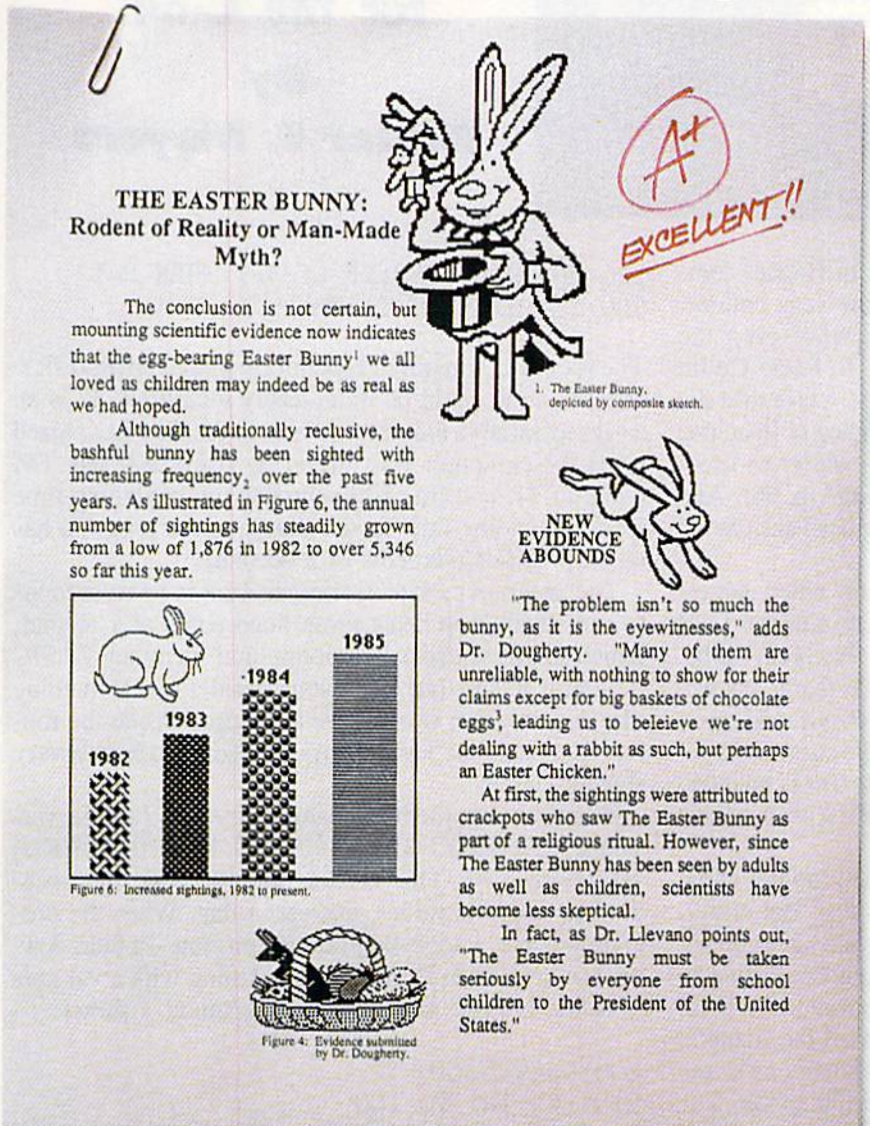
Replace old, worn-out parts. You can build anything with Writer's Workshop. And repair old stuff, too. Just decide which parts have to come out and which new ones go in.

Then hit the key and stand back.

Instantly, the "search and replace" drills through your old



GEST CASES
H A WORKSHOP.



THE EASTER BUNNY:
Rodent of Reality or Man-Made Myth?

The conclusion is not certain, but mounting scientific evidence now indicates that the egg-bearing Easter Bunny[1] we all loved as children may indeed be as real as we had hoped.

Although traditionally reclusive, the bashful bunny has been sighted with increasing frequency[2] over the past five years. As illustrated in Figure 6, the annual number of sightings has steadily grown from a low of 1,876 in 1982 to over 5,346 so far this year.

1. The Easter Bunny, depicted by composite sketch.

Figure 6: Increased sightings, 1982 to present.

"The problem isn't so much the bunny, as it is the eyewitnesses," adds Dr. Dougherty. "Many of them are unreliable, with nothing to show for their claims except for big baskets of chocolate eggs[3], leading us to beleieve we're not dealing with a rabbit as such, but perhaps an Easter Chicken."

At first, the sightings were attributed to crackpots who saw The Easter Bunny as part of a religious ritual. However, since The Easter Bunny has been seen by adults as well as children, scientists have become less skeptical.

In fact, as Dr. Llevano points out, "The Easter Bunny must be taken seriously by everyone from school children to the President of the United States."

Figure 4: Evidence submitted by Dr. Dougherty.

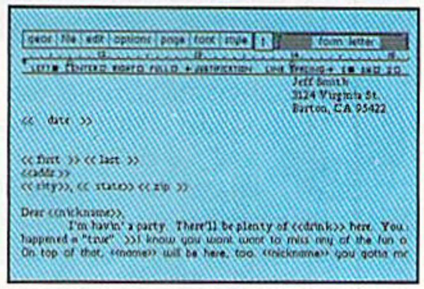
text, replacing worn-out words and phrases with your brand new ones.

For more serious cases, hand the job over to the Workshop's Text Grabber. It takes text from several word processors—like Paper Clip™—and lets you overhaul them with new GEOS fonts, formats and graphics.

A few more built-in features. Every project leaves the Workshop looking beautifully finished, too. Because it not only comes with LaserWriting compatibility, there's even a LaserWriter for you to print on.

You simply upload your files to QuantumLink.™ Then they're printed and mailed back.

Convenient, or what?



Of course, you don't want to keep good-looking documents like this to yourself. So we built in geoMerge. Which customizes your geoWrite form letters to people on your mailing lists.

So if your plans call for some real masterpieces, do something really constructive about it. Call your software dealer and requisition Writer's Workshop.

Who knows? You just might build a name for your self.

To order call 1-800-443-0100 ext. 234
Writer's Workshop $49.95
(California residents add 6.5% sales tax.)
$2.50 US/$5.50 Foreign for shipping and handling. Allow six weeks for delivery.

WRITER'S WORKSHOP

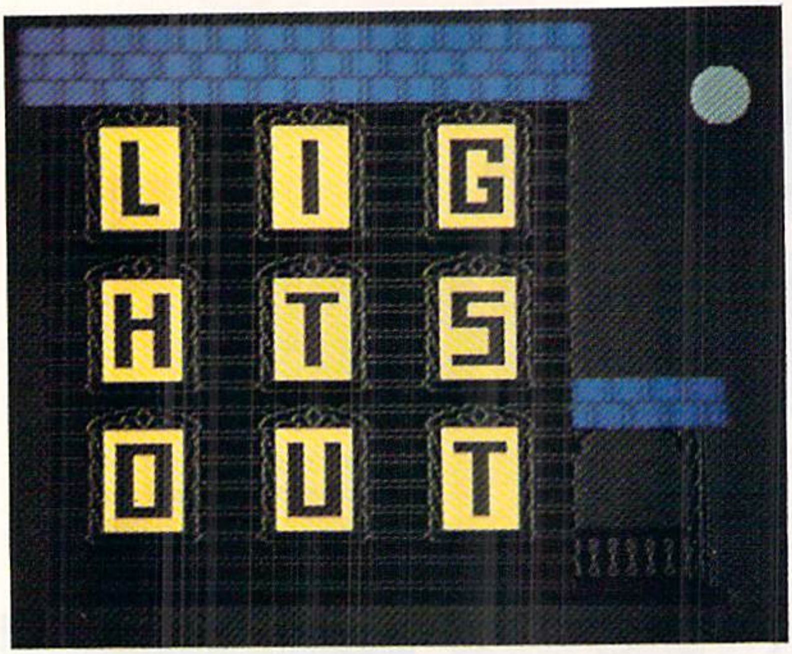
GEOS COMPATIBLE

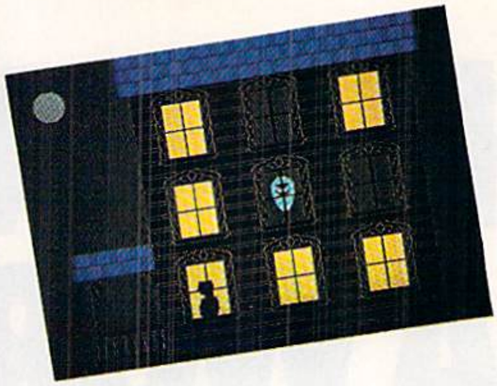


Berkeley Softworks

The brightest minds are working at Berkeley.

Reader Service No. 237





For the C-64

By

Walter E. Meyers

On the frequency-of-use list of BASIC commands, USR must be at the very bottom. And it's not hard to see why—even the experts look askance at it. In Raeto Collin West's *Programming the Commodore 64,* we're told the command "requires a thorough understanding of [machine language]; in BASIC, it's nearly always easier to use a DEF FN expression, and not much slower" (p. 66). And later, "USR is helpful with [machine language] calculation programming" (p. 251).

Not many computer games I know show much interest in machine language calculation programming, so USR would seem to be rightly ignored. But it only seems to be.

The advantage of the USR command is that it lets you send a value to a machine language subroutine, and, even more important for our purposes, lets the subroutine return a value to BASIC. The game *Lights Out* is intended as a demonstration of how USR can bring near-arcade speed to a game in BASIC.

Fast movement in BASIC is no problem on the C-64, especially if the program is of modest size. But checking for variables is often where the program slows down. In *Lights Out* the premise is that you're ghostbusting in a house haunted by five specters. You can exorcise them one at a time if you can manage to get all the lights in the house turned on at once: that will banish one of the ghosts. Then you try again, with a speedier spook. The programming of the game was straightforward until it came time to keep track of the lights in nine rooms. The player turns them on by hitting the fire button when he enters a room; the ghost turns them off (by magic) when *he* enters. Thus, nine values had to be checked every time the joystick was read. To test the various methods available for checking these locations, I write five almost-identical programs. The first used BASIC variables to store whether the light was on or off:

```
200 TM=TI
210 FOR I=1 TO 100
220 FOR J=0 TO 8:IF L(J)=1 THEN F=1
230 NEXT:NEXT:T=TI-TM
```

The loop had a hundred repetitions so that small differences in time could be more easily measured. TI is an assigned variable that records how much time has passed since the computer was turned on. Line 200 sets TM equal to TI, and line 230 subtracts the beginning time from the ending time to see how long the program has taken in jiffies (sixtieths of a second).

The program took 410 jiffies, or almost seven seconds to run. Each loop takes seven hundredths of a second, which might not seem too long—and for many BASIC programs it isn't, but when you consider that something like this program would have to be used inside the routine that reads the joystick, you are going to have a very sluggish game.

A second test method changed just one line: in version 2, 220 reads FOR J=49152 TO 49160:IF PEEK(J) =1 THEN F=1. This version simply peeks nine locations to store the values, and sets a flag. When the program was run, it took 414 jiffies to complete—a little slower than version 1. Doing the same thing with a variable is faster, but not much faster, as method 3 shows:

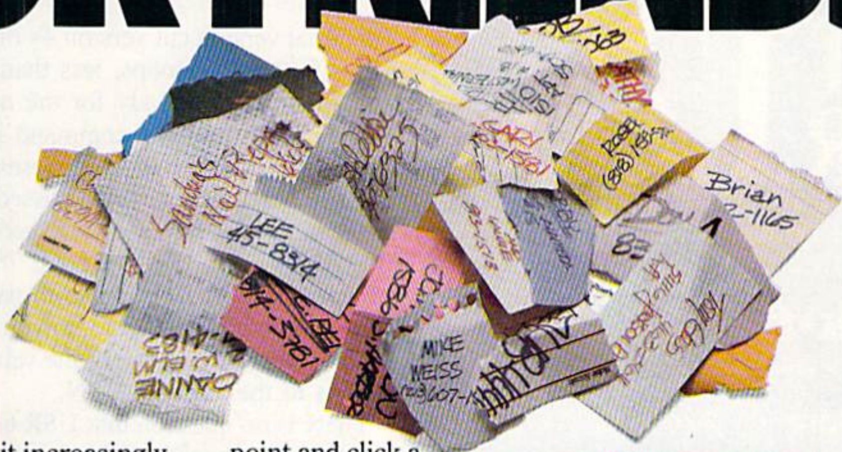
```
200 K=49152:TM=TI
210 FOR I=1 TO 100
220 FOR J=K TO K+8:IF PEEK(J)=1 THEN F=1
```

and so on. It took 367 jiffies to complete, or about six seconds.

The answer to time problems in BASIC is supposed to be a subroutine in machine language. For a third test, I wrote a short ML subroutine that looked in the nine locations and placed a 1 in 49244 if the conditions were right. The BASIC part was:

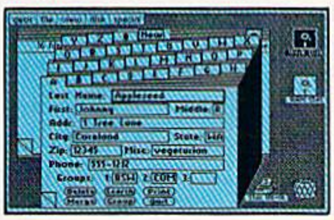
```
200 TM=TI
210 FOR I=1 TO 100
```

ARE YOU SEARCHING FOR FRIENDS?



If you're finding it increasingly difficult to find anything at all, maybe it's time you found out about geoDex. The GEOS-compatible directory that generates mailing lists. Prints address labels. And sorts out all sorts of things for your Commodore.

Try directory assistance. With a little help from geoDex, you can call up a directory organized from any three categories you choose. Which means you can list your friends by name, telephone number or almost anything else that can be assigned its own three-character code.



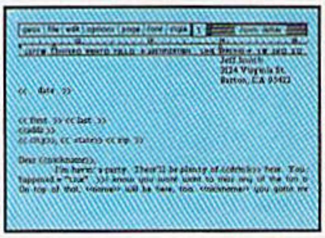
Like "MEN" for guys you know. Or "GRL" for girls you know. Or "FOX" for girls or guys you'd like to know.

But no matter how you choose to categorize them, if you can point and click a mouse, you can call up any list of friends with geoDex's easy-to-read graphics.

Our most inviting feature. Of course, once you've gotten your friends organized, the next thing we recommend you do with geoDex is really very simple.

Throw a party.

You see, geoDex comes with geoMerge, a mail merge program that customizes form letters, announcements—even party invitations—with the names and addresses stored in geoDex. First you write the letter with geoWrite. Then you select a list from geoDex.



Put them both together with geoMerge and it's toga time!

The search is over. So if you're tired of looking for friends, waltz right down to your software dealer and ask him for geoDex. We can't guarantee it'll win you more friends, but it'll certainly keep you from losing them.

To order call 1-800-443-0100 ext. 234

geoDex $39.95

(California residents add 6.5% sales tax.)

$2.50 US/$5.50 Foreign for shipping and handling. Allow six weeks for delivery.

GEODEX GEOS COMPATIBLE



Reader Service No. 242

Berkeley Softworks

The brightest minds are working at Berkeley.

```
220 SYS 49256: IF PEEK(49244)=1 THEN F=1
```

and so on. The reduction was enormous, as expected. The program took 122 jiffies, or just over two seconds. But this version had an unfair advantage: after each time the flag was set to 1, the program would have had to POKE 0 into 49244 to set the routine up for the next call. That POKE would have eaten into the time advantage of version 4.

Now for USR. Version 5 of the program was this:

```
200 POKE 785,10:POKE 786,192
210 TM=TI
220 FOR I=1 TO 100
230 WIN=USR(0):IF WIN=1 THEN F=1
240 NEXT
```

This final version cut version 4's time in half: It took 51 jiffies for the 100 loops, less than one second. And it was automatically ready for the next cycle.

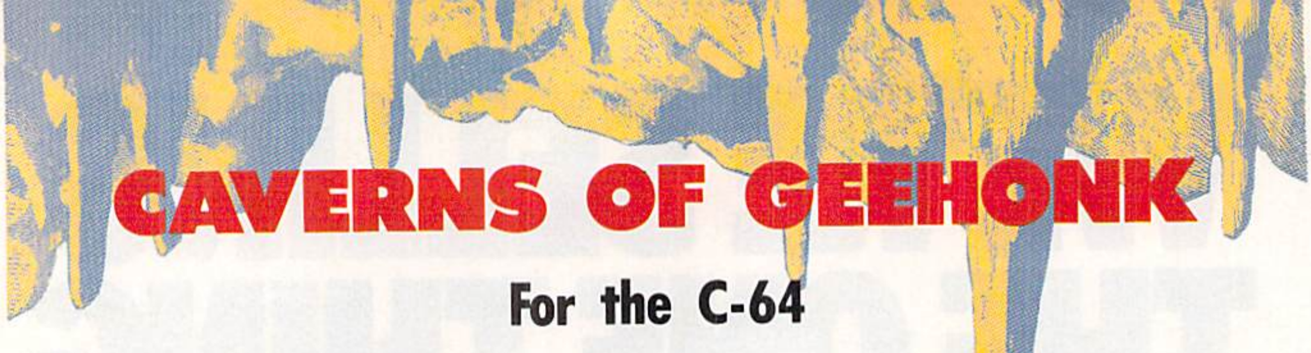
You'll find the USR command in line 260 of *Lights Out.* Notice the zero in parentheses following USR; this value in parentheses can be passed to the machine language subroutine beginning at the address POKEd in lines 110-120: POKE 785, 104:POKE 786, 192. In this case, we don't care what the value in parentheses is because we're not going to use it for anything. What we do care about is what we get back, the value that the command assigns to the variable WIN.

There is no question that USR takes some extra work to master. The book by West mentioned above is an excellent place to start, as long as the reader keeps in mind that he doesn't have to use every feature of a command for that command to be valuable. Those who want to disassemble a very simple machine language routine for USR may wish to examine the data statements in line 1230 of *Lights Out.*

One final note: As with any game requiring fast hands on a joystick, *Lights Out* is going to need some calibrating the first time you play it. Some fire buttons have a hair-trigger; others need to be mashed. Some joysticks respond instantly; others have a lot of free play. The variable that controls the difficulty of the game is GS (for Ghost Speed) in line 150. It is initially set at 15, and is reduced by 2 for each successive ghost in line 410: GS=GS−2. Get the starting value first—increase GS in line 150 until you can beat the first ghost easily. If, at that value, ghost five doesn't give you much of a problem, try making the reduction greater, changing the first command in line 410 to something like GS=GS−3. Ideally, you should have a lot of trouble with the fastest ghost.

Type the game and save it to disk or tape. After you've saved it, type RUN 5000 to check your entry of the data statements. Lines 5000 to the end are a checksum program that will tell you whether you've entered the data correctly. Once you get OK's from the checksums, you can delete everything from 5000 on. ☐

SEE PROGRAM LISTING ON PAGE 94



CAVERNS OF GEEHONK

For the C-64

By John Fedor

Just before World War III destroyed the Earth, a small group of scientists escaped to a small, unknown planet in our solar system. This planet was named Geehonk after the small creatures that lived there. The Geehonks got along well with the Earthlings, and soon allowed them to colonize a small section of the planet. A few years after the colonization was established, a large tremor was felt. Tom Gauthier, the leader of the colonization, sent a scout ship to see what the problem was.

About 100 kilometers from the colony was a large hole in the ground. The pilot, Nick Huculak, reported back that he was going to enter it. As he entered the hole, he realized it was more like a cavern. The walls had columns that grew from the ceiling and changed to different shades of blue. Since he needed the flying room, Nick started to shoot the growing columns. The columns just continued to grow. After awhile, an alien appeared and started moving towards his ship. Nick tried to shoot it but nothing happened. The columns continued to grow, so he continued shooting. Then another alien appeared. Nick radioed back that he needed help. Just then, Nick's ship hit a column and exploded....

Such is the basis of *Caverns of Geehonk*. The object is to destroy the columns before they destroy you. You fly your ship with a joystick (Port 1 for player 1, Port 2 for player 2). Pressing up, down, left, or right will move you in that direction. Pressing the button will release a shot in the direction you are facing. You have an unlimited number of shots. Remember that the aliens are immune to your shots.

There are 42 different gameplay combinations, made possible by three choices: player mode, level, and lives. There are three player modes. The first is a one player game; the second allows two players to alternate in taking turns; the third allows both players to play on the same screen. This option is controlled by the f1 key while the title screen is in view. The f3 key changes the level. There are 7 levels to choose from. Level 1 has all the aliens appear in front of the columns, while level 7 has all the aliens appearing behind the columns. The other levels have varying numbers of aliens behind the columns. The number of aliens does not change according to the level, just the number of aliens that appear behind the columns. The third option has two settings. You can choose between three and five lives to play with. This option is adjusted by the f5 key. The f7 key starts the game.

While playing the game, there are several things to be aware of. One is that the number of lives left for each player is indicated by the asterisks under each player's score. The high score is updated automatically and kept posted with each player's score. Player 1 is the green spaceship, while player 2 is the light green ship. A player can die by 1) hitting a column, 2) hitting an alien, 3) hitting another ship, or 4) hitting the other ship's shot. The two player mode with both players on the same screen is the most enjoyable. You can try to kill the other ship and keep the points to yourself. You can also work together and cover each other's backs.

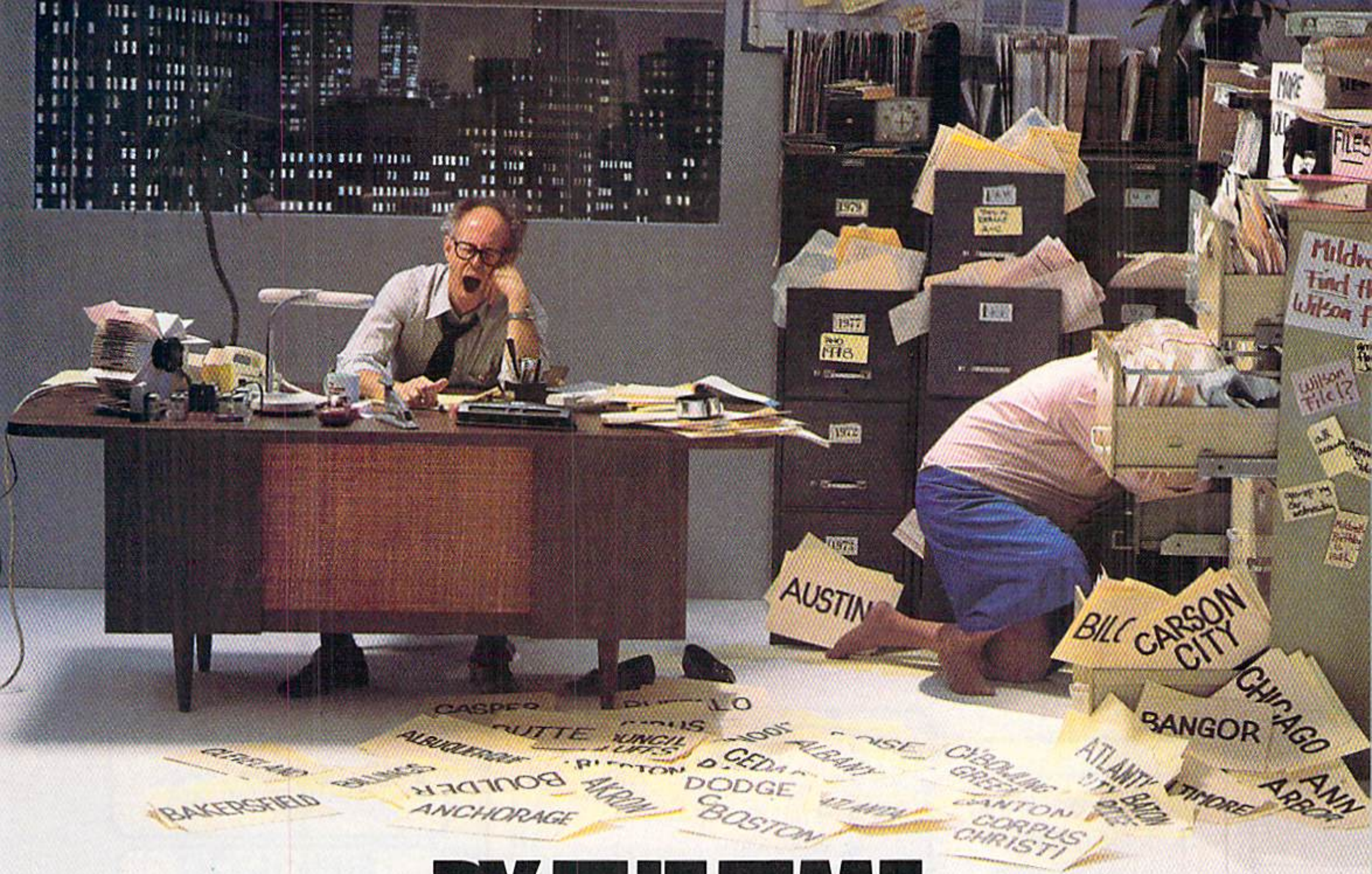
When shooting at columns there are two things you should know. Shooting at the bottom of the column only eliminates one block of the column for 5 points. If you shoot from the side, you destroy that block and all blocks below it. You also score 5 points for each of the blocks that are destroyed. This is the fastest way to score. It can also be dangerous. Just sitting at the bottom of the screen and shooting up will not work, because the columns on either side of your shot will come down and get you. Every 1000 points, a new alien will come out. On the two player mode with both players on at the same time, another alien comes out when the sum of the two scores is divisible by 2000. A note will sound off when an alien is coming onto the screen. You can pause the game by pressing the RUN/STOP key. Pressing it again will restart the game. So when playing this game, keep these points in mind.

TYPING IT IN

This game is made up of three programs. The first is a short BASIC program that boots up and executes the game, the second is the sprite shapes, and the third is the ML routines. For the second two programs, you will need to use *Flankspeed* (see page 93). First, type in the first program and save it under "GEEHONK CAVERNS". Next, type in the second program using *Flankspeed*. Use 3B00 and 4000 for starting and ending addresses. Save the file under the name "COG.SP". Finally, type in the third program using *Flankspeed*. Use C000 and CE4C for starting and ending addresses. Use "COG.ML" for the filename. To play the game, just load "GEEHONK CAVERNS",8 and run it.

With the numerous options available, you can play this game a while without its becoming dull. A final note for two players on the same screen: Never trust an alliance. You never know if that person will shoot you in the back. ☐

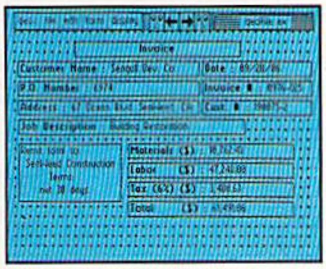
SEE PROGRAM LISTING ON PAGE 107



BY THE TIME SHE GETS TO "PHOENIX," HE'LL BE SLEEPING.

Having thousands of facts is one thing. Finding the ones you need is another. Which is why you should consider buying geoFile. The easy-to-use database manager for GEOS-equipped Commodores.

Whether they're receivables or recipes, once you have geoFile, you can fly through facts in seconds, clicking and picking the ones you want, just the way you want them.



It's as simple as filling out a form.

The geoFile "form" organizes all kinds of information. Like names, numbers, rates of objects' acceleration when dropped from two-story buildings—you name it. As much as you can fit on a printed page.

Once your data is in, the real fun begins.

You want names of bus drivers? From Arizona? Under five foot six? Between the ages of 33 and 35? With incomes of $22,396 or more? Who sneezed in June?

Just click your mouse and watch geoFile go to work. Searching. Sorting. Comparing and listing the data alphabetically. Or numerically. Or in whatever priority your form specifies.

You can put the data into form letters and lists with geoMerge. Or into math functions, with geoCalc. Or if you really want to get fancy, you can display your information graphically with geoChart.

And geoFile does it all in seconds.

Now, with all that in mind, what are you going to do—spend a few bucks on geoFile?

Or spend all night wishing that you had?

To order call 1-800-443-0100 ext. 234

geoFile $49.95

(California residents add 6.5% sales tax.)
$2.50 US/$5.50 Foreign for shipping and handling. Allow six weeks for delivery.

GEOFILE



Berkeley Softworks

The brightest minds are working at Berkeley.

Reader Service No. 244

COMPUTER CENTERS OF AMERICA'S

SPRING FOR THESE LOW PRICES!

NEW!
WY 1400-01
■ 256K RAM STD, EXPANDABLE TO 640K ■ ONE 360K HALF-HEIGHT DISK DRIVE ■ 9.54 MHZ, 8088-1 PROCESSOR WITH SOCKET PROVIDED FOR 9.54 MHZ 8087-1 ■ 4.77 MHZ COMPATIBILITY MODE ■ MS DOS 3.1 WITH GW BASIC

$899.99



WYSE

CCA GOES CLONE CRAZY!

NEW!
WY 1400-02
DUAL DISKETTE DRIVE. SAME AS WY 1400-01, WITH ADDITION OF A SECOND HALF-HEIGHT, 360K DRIVE, 640K RAM ON MAIN PROCESSOR BOARD.

$999.99

NEW!
WY 1400-20
WITH ONE 20MB HARD DRIVE. SAME AS WY 1400-02 WITH ADDITION OF A HALF-HEIGHT 20MB HARD DISK DRIVE.

$1399.99

MAGNAVOX

$199



SAME AS COMMODORE 1802

8505
- RGB TTL, RGB ANALOG, COMPOSITE INPUTS
- 390 DOTS RESOLUTION (RGB) HORIZONTAL
- 240 LINES RESOLUTION (VERTICAL)
- 40 x 25 CHARACTER FIELD, 1000 CHARACTERS TOTAL

$239



8562
- RGB TTL, RGB ANALOG, COMPOSITE INPUTS
- 640 DOTS RESOLUTION (RGB) HORIZONTAL
- 240 LINES RESOLUTION (VERTICAL)
- 80 x 25 CHARACTER FIELD, 2000 CHARACTER TOTAL

commodore
1571 DISC DRIVE
~~$239.95~~ $229.95

INTERFACES

P.P.I.	$34.95
XETEC JR	$39.95
XETEC SR	$59.95
M.W. 350 10K BUFFER	69.95

SP-1000
- Built-in Commodore Interface
- 2-Year Warranty
- Near Letter Quality Mode

~~$159.95~~ $154.95

SEIKOSHA
LIMITED TIME ONLY
SPECIAL INTRODUCTORY PRICE

commodore
64C INCLUDES
• GEOS/SOFTWARE
$169.95 FREE IN BOX

star micronics

***NEW* NX-15**
DRAFT 120 CPS • NLQ 30 CPS • 15" WIDE CARRIAGE • FRONT PANEL/CONTROL • STANDARD FRICTION AND TRACTOR FEED • IBM EPSON COMPATIBLE
~~$359.95~~ $329.95

NX-10
• DRAFT 120 CPS • NLQ 30 CPS • 5K BUFFER • DOT MATRIX • EASY FRONT PANEL OPERATION • FRICTION AND TRACTOR FEED • PARALLEL INTERFACE • FULL GRAPHICS
~~$219.95~~ $189.95

SB-10
• 24 PIN • DOT MATRIX • DRAFT QUALITY 144 CPS • LETTER QUALITY 54 CPS • FRICTION AND TRACTOR FEED • PARALLEL INTERFACE • PROPORTIONAL CHARACTER SET
~~$349.95~~ $299.95

***NEW* NP-10**
IBM COMPATIBLE
100 CPS • 25 NLQ • 9 WIRE DOT MATRIX • STANDARD PUSH TRACTOR
~~$169.95~~ $149.95



GEOS™
GRAPHIC ENVIRONMENT OPERATING SYSTEM
• 5 DIFFERENT FONTS • DESK TOP • GEO PAINT • GEO WRITE • DESK ACCESSORIES

NEW FONT - PACK
DESK - PACK
FOR THE COMMODORE 64
CALL FOR PRICE



commodore
128 PERSONAL COMPUTER
$249.95

Paperback Writer 128
Paperback Filer 128
Paperback Planner 128
YOUR CHOICE
$29.95
for the Commodore 128

commodore
64C PACKAGE
INCLUDES:
- Commodore 64 Computer
- Commodore 1541 Disc Drive
- A Color Monitor with Cables

CALL FOR PRICE

FOR ORDERS ONLY
IN N.Y. STATE
CALL TOLL FREE
1-800-221-2760
OUT OF STATE CALL
1-800-631-1003
FOR ALL OTHER INFO
516-349-1020

COMPUTER
CENTERS OF AMERICA
81 TERMINAL DRIVE
PLAINVIEW, NY 11803

Reader Service No. 250

Check, Money Order, MC or VISA accepted. No additional charge for MasterCard and Visa. Call for shipping and handling information / NYS residents add applicable sales tax / Prices and availability are subject to change without notice / All factory fresh merchandise with manufacturer's warranty. Dealers Welcome. Call for recent price reductions and new rebate information. Plus shipping and handling. No returns without return authorization number.

PINBALL ARCADE

For the C-64

By Tony Brantner



Before the introduction of home computers, playing pinball meant either pumping a ton of quarters into someone else's machine, or buying one of your own and throwing out the living room sofa to make room for it. *Pinball Arcade* does away with all the expense and inconvenience by converting your Commodore 64 into a pinball machine which can be easily stored on disk or tape.

Using *Flankspeed* (page 93), type in *Pinball Arcade* and be sure to save a copy before running. Type SYS 49152 and press RETURN to start. Use a joystick plugged into Port 2 to move the spring in the lower right corner up or down, pressing the fire button to release the ball. Once the ball is in play, the fire button is used to control the flippers at the bottom of the screen. When hitting the ball back, you can also set the force of the rebound by simultaneously pressing the fire button and moving the joystick up or down.

There are five targets, each with a corresponding point value displayed in the center. An extra ball is awarded for every thousand points with a maximum of nine in reserve. The score is displayed at the top of the screen, along with the number of turns remaining and the high score for the current session. Press the SHIFT LOCK key to freeze the game, and press it again to resume play. ☐

SEE PROGRAM LISTING ON PAGE 100

Back Issues

Use the coupon below to complete your collection of *Ahoy!*, and catch up on all the programs and articles you've missed in the past three years! Issues 1 and 4 are sold out, and 2 and 3 are down to a handful…so order before the magazines you want disappear from stock.

ISSUE #2—FEB. '84 $10.00
Illustrated tour of the 1541! Artificial intelligence! Synapse's Ihor Wolosenko interviewed! And ready to enter: Music Maker Part II! Screen Manipulation! Night Attack! Relative Files!

ISSUE #3—MAR. '84 $10.00
Anatomy of the 64! Printer interfacing for VIC & 64! Educational software series begins! And ready to enter: Address Book! Space Lanes! Random Files on the 64! Dynamic Power!

ISSUE #5—MAY '84 $4.00
Future of Commodore! Inside BASIC storage! Memory management on the VIC & 64! Guide to spreadsheets! And ready to enter: Math Master! Air Assault! Biorhythms! VIC Calculator!

ISSUE #6—JUNE '84 $4.00
Game programming column begins! Program generators! Rupert on inputting! Memory management continues! And ready to enter: Post Time for the 64 & VIC! Alpiner! Sound Concept!

ISSUE #7—JULY '84 $4.00
MSD dual disk drive! Database buyer's guide! Training your cursor! Screen displays! File Sleuth! Users Groups! And ready to enter: Renumbering! Checklist! Math Defender! Brisk!

ISSUE #8—AUG. '84 $4.00
Choosing a word processor! Computational wizardry! Creating your own word games! Sound on the 64! And ready to enter: Micro-Minder! Directory Assistance! The Terrible Twins!

ISSUE #9—SEPT. '84 $4.00
Program your own text adventure! Build a C-64 cassette interface! Video RAM! And ready to enter: Salvage Diver! DOS! Sound Explorer! The Castle of Darkness! Base Conversions!

ISSUE #10—OCT. '84 $4.00
C-64 graphics programs! Bit-mapped graphics! Joystick programming! And ready to enter: VIC 40 Column Operating System! BAM Read & Print! Emerald Elephant! Lawn Job!

ISSUE #11—NOV. '84 $4.00
Music programs & keyboards for the 64! Graphics feature continues! And ready to enter: PTE word processor! Block Editor! Alternate Character Set for the 64! The Tunnel of Tomachon!

ISSUE #12—DEC. '84 $4.00
Buyer's guide to printers! 1525 printer tutorial! Custom characters! User Guide to KMMM Pascal! Diving into BASIC! And ready to enter: Construction Co.! Space Patrol! Cross Ref!

ISSUE #13—JAN. '85 $4.00
VIC/64 OS exposed! Sprites! 1541 device # disconnect switch! Ghostbusters! And ready to enter: Ultra Mail! Music Tutor! Alice in Adventureland! Midprint! To the Top! Tape/Disk Transfer!

ISSUE #14—FEB. '85 $4.00
Printer interfacing! Multicolor sprites! Modems! Bulletin boards! Theory of game design! And ready to enter: Futurewar! Fontasia! VIC Eraser! Insurance Agent! Flankspeed! Telelink 64!

ISSUE #15—MAR. '85 $4.00
Making multiscreen gameboards! Inside the Plus/4! Commodore DOS! And ready to enter: Old Routine! Programmable Functions! Automatic Line Nos.! Home Budget! Salmon Run!

ISSUE #16—APR. '85 $4.00
Assembly language column begins! Programming the joystick! 1541 disk drive alternatives! And ready to enter: Hop Around! Faster 64! Booter! Elecheck! BASIC Trace! Space Hunt!

ISSUE #17—MAY '85 $4.00
Disk drive enhancements! Install a reset switch! Assembler escapades! And ready to enter: Super Duper! Two-Column Directory! DSKDU! Raid! DOS Plus! Font Editor! Tile Time!

ISSUE #18—JUNE '85 $4.00
Music & graphics entry systems! How modems work! Inside the 6510! And ready to enter: Quad-print! Mapping 4.4! Towers of Hanoi! Speedy! Duck Shoot! The 6510 Simulator!

ISSUE #19—JULY '85 $4.00
PROM programming! 3-part harmonies on VIC/64! Speeding pixels! And ready to enter: Auto-Append! Script Analysis! Wizard of Im! Lucky Lottery! Brainframe! Etch! Printat!

ISSUE #20—AUG. '85 $4.00
Inside the 128! Read-world simulations! Sound effects! And ready to enter: Windows! Formatter! Sound-a-Rama! Screen Dump! Selectachrome! Disintegrator! Fidgits! Gators N Snakes!

ISSUE #21—SEP. '85 $4.00
Inside the 1571 drive and 128 keyboard! Sprite programming! And ready to enter: Fastnew! Go-Lister! File Lock! Dragon Type! Superhero! Auto-Gen! Moxey's Porch! Fish Math!

ISSUE #22—OCT. '85 $4.00
Create cartoon characters! Infinitesimal intrigue! Inside copy protection! And ready to enter: Shotgun! Maestro! Solitaire! Mystery at Mycroft Mews! Gravinauts! 1541 Cleaning Utility! ShadeyDump!

ISSUE #23—NOV. '85 $4.00
Adventure gaming! ML sprite manipulation! BASIC for beginners! And ready to enter: Lightning Loader! Knight's Tour! Chopper Flight! Rhythmic Bits! Instant Bug Repellent! File Scout! Slither!

ISSUE #24—DEC. '85 $4.00
Speech synthesizers! The IBM Connection! The year's 25 best entertainments! And ready to enter: Gypsy Starship! Directory Manipulator! Cloak! Gameloader! Jewel Quest! Lineout! Santa's Busy Day!

ISSUE #25—JAN. '86 $4.00
Build a speech synthesizer! Survey of sports games! And ready to enter: The Martian Monsters! Streamer Font! Microsim! The Haunted Castle! Knockout! Infraraid! Alarm Clock! Memory Check!

ISSUE #26—FEB. '86 $4.00
Windows! Build an auto-exec cartridge! Align your 1541! Survey of flight simulators! Structured programming! And ready to enter: Arena! Head to Head! Crabfight! Treasure Wheel! Character Dump!

ISSUE #27—MAR. '86 $4.00
Programming educational games! Memory dumpers! Choosing a copy program! Custom characters! And ready to enter: Ahoy! Term 128! Trivia Game Maker! Brickbusters! Easy Lister! Programmer's Aid!

ISSUE #28—APR. '86 $4.00
Comet catching! Survey of action and strategy games! Screen dumping! And ready to enter: Chrono-Wedge! Mr. Mysto! Air Rescue! Notemaker! Screen Window! JCALC! Hidden Cavern! Swoop!

ISSUE #29—MAY '86 $4.00
128 graphic bit map! Epyx strategy guide! 128 commands! ML music programming! And ready to enter: Bigprint! Star Search! Failsafe! English Darts! Ski Folly! Free RAM Check! Alchemist's Apprentice!

ISSUE #30—JUNE '86 $4.00
Debugging dilemmas! Public domain software! Winning at Ultima! Computer Aided Design! And ready to enter: LazyBASIC! Got A Match? Star Strike! Queen's and Bishop's Tours! Shaker! Trackdown!

ISSUE #31—JULY '86 $4.00
Inside the Amiga! Conditional branching! Chess programs! 128 and 64 DOS! And ready to enter: Screen Sleuth! Escape from Skull Castle! Head-On! Nebergall Run! Wordcount! Crazy Joe!

ISSUE #32—AUG '86 $4.00
Inside the Amiga, part II! Approaching infinity! C-64 war simulations! Pascal for beginners! And ready to enter: Reversi! Highlight! Disk Cataloger! Meteor Run! Trim! Step On It! Flap!

ISSUE #33—SEP. '86 $4.00
Windows and viewports! Sound & music on the 64! COMAL! And ready to enter: The Last Ninja! Speech64! Multi RAM! Dogcatcher! Trapped! Matchblocks! Variable Manager! Dual Dump!

ISSUE #34—OCT. '86 $4.00
Build a digital oscilloscope! ML speed techniques! And ready to enter: Vault of Terror! Quick Change! Penguins! Attack Force! Disk Checkup! Dvorak Keyboard! Mountaineer Mack! 128 Autoboot!

ISSUE #35—NOV. '86 $4.00
C-128 shadow registers! Data file handling! PROMAL! Habitat! And ready to enter: Teleporter! 128 RAM Check! Discs of Daedalus! Guardian! Tenpins! Syntax Patrol! Deluxe List! Long Lines!

ISSUE #36—DEC. '86 $4.00
File manipulation! C-128 shadow registers! Football games! And ready to enter: The Artist! Minotaur Maze! Mouse in the House! Lazy Source Code! Rebels and Lords! Speedway! The Editor!

ISSUE #37—JAN. '87 $4.00
Basic magic! Best games of '86! DOS for beginners! And ready to enter: Vortex! Hanger 14! BASIC Ahoy! Catacombs! Lixter! Dark Fortress! Perma-Line! Starfighter! Bugout! Screens!

ISSUE #38—FEB. '87 $4.00
Hacking into machine language utilities! Amiga RAM expanders! And ready to enter: Window Magic! Crunchman! User Conventions! The Adventurer! More BASIC 128! Jailbreak! Turtle Rescue!

Use coupon or facsimile. If ordering more than three issues, list choices on separate sheet.

If you have a modem and want more complete information on any of the back issues listed, call *Ahoy!*'s Bulletin Board Service at 718-383-8909.

Ahoy! BACK ISSUES
ION INTERNATIONAL INC.
45 West 34th Street
Suite 407
New York, NY 10001

Please Send Me The Following:
______ Copies of issue number ______
______ Copies of issue number ______
______ Copies of issue number ______

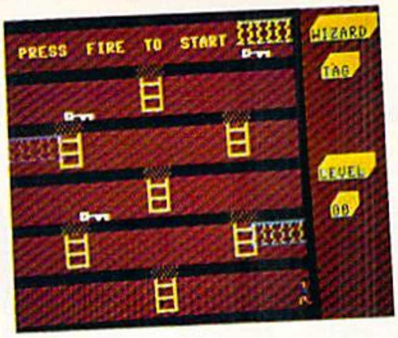
Enclosed Please Find My Check or Money Order for $________
(Outside the USA please add $1.00 for every copy)

NAME ______________________
ADDRESS ______________________
CITY ______________ STATE ______________ ZIP CODE ______________

WIZARD TAG

For the C-64

By Bob Blackmer



Wizard Tag is an arcade game for the C-64 with multicolor sprites, realistic animation and music. The object is to find and collect the keys that will make the wizard appear, so you can catch him. You reach the different floors of the castle by using the ladders, while avoiding the monster vines that will be patrolling some floors.

When the game begins, the wizard hides himself and places three keys in the castle. The theme music will begin playing at a slow tempo and the vines will slowly make their way back and forth across the castle floors. Make your way around the castle, collecting all the keys. When the wizard appears, tag him. After tagging the wizard, he will play along with the music on guitar. The background music will step up in tempo as will the movement of the monster vines. The wizard will then hide himself and place three more keys to see if you can tag him again.

I must warn you about the monster vines – any contact with these beauties will result in the wild thrashing of your body as the vines ensnare you with their killer appendages. Sometimes, to be cruel, the wizard will leave two keys touching each other. The weight of the combined keys is too much for you to pick up. The only way to collect these is to run back and forth across them until they are taken.

At the beginning of the game you can easily outrun the vines. In fact, you will find yourself waiting for them to move to go after a key. After a few levels you will see this advantage reverse. The speed of the vines will force you to make split-second decisions getting through a floor.

The highest level I reached was the 15th. I'm confident there are some readers who will surpass that level. Another challenge: can you guess what song the theme music is taken from?

Wizard Tag is written entirely in machine language and must be entered using *Flankspeed* (see page 93). After typing in and saving *Wizard Tag*, reset the computer and LOAD "WIZARD TAG",8,1 then SYS 49152 to start. □

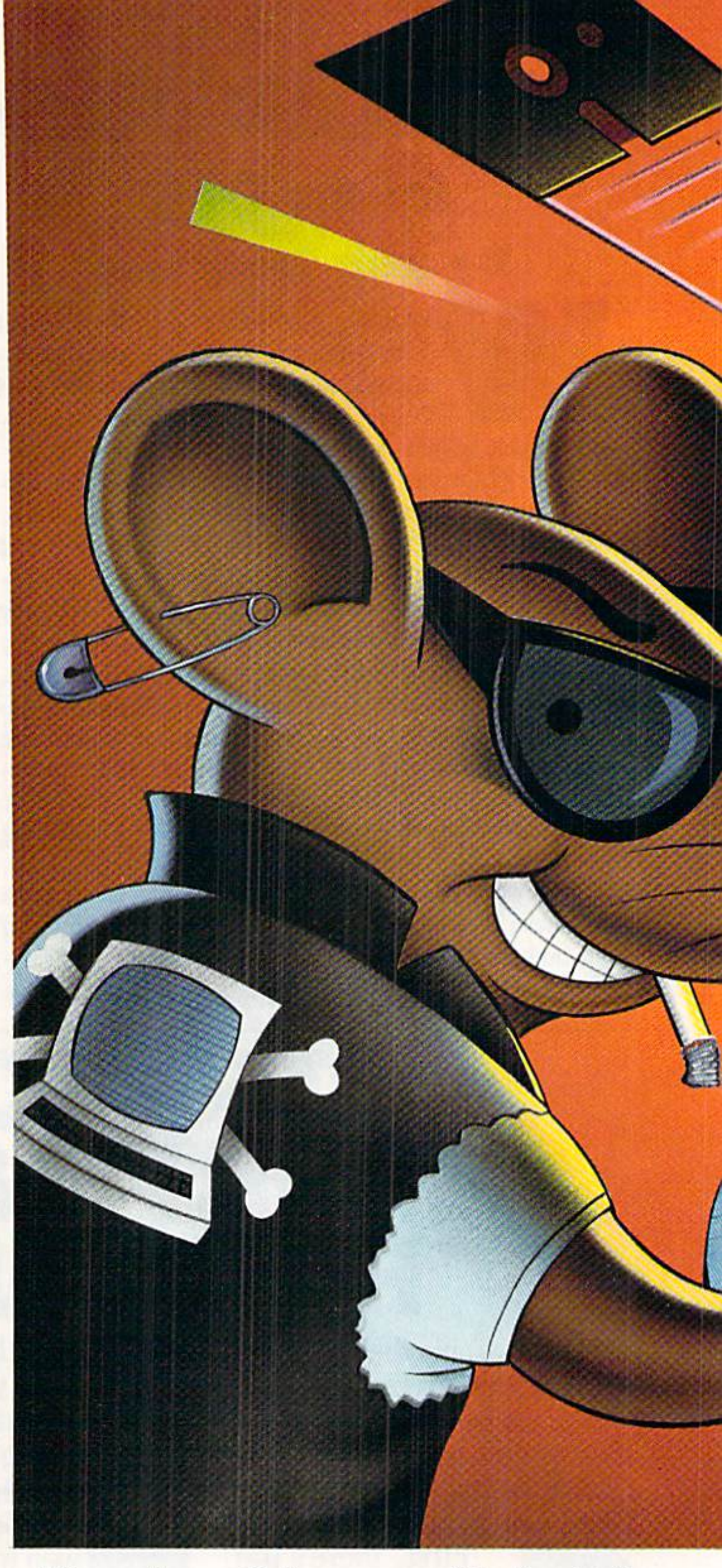
SEE PROGRAM LISTING ON PAGE 97

MICHAEL R. DAVILA

RUPERT REPORT

Basic ESTHETICS

Writing Bad Programs without Really Trying



Have you seen any bad programs recently? Have you written any? It is easy to recognize a bad program. It is the program which asks you to enter the date without giving you any clue as to the expected format. After trying "2/12/87", "Feb. 12, 1987", "2-12-87", and every other variation you can think of, always with the same computer response, "INVALID DATE, TRY AGAIN!", you know you have found a bad program.

A bad program is one which poses the question "Do you want to continue (YES/NO)?" and won't let you proceed unless you type the entire word "YES". Entering "Y" or <RETURN> brings the program to an abrupt halt, discarding all the data you have been entering for the last 10 minutes.

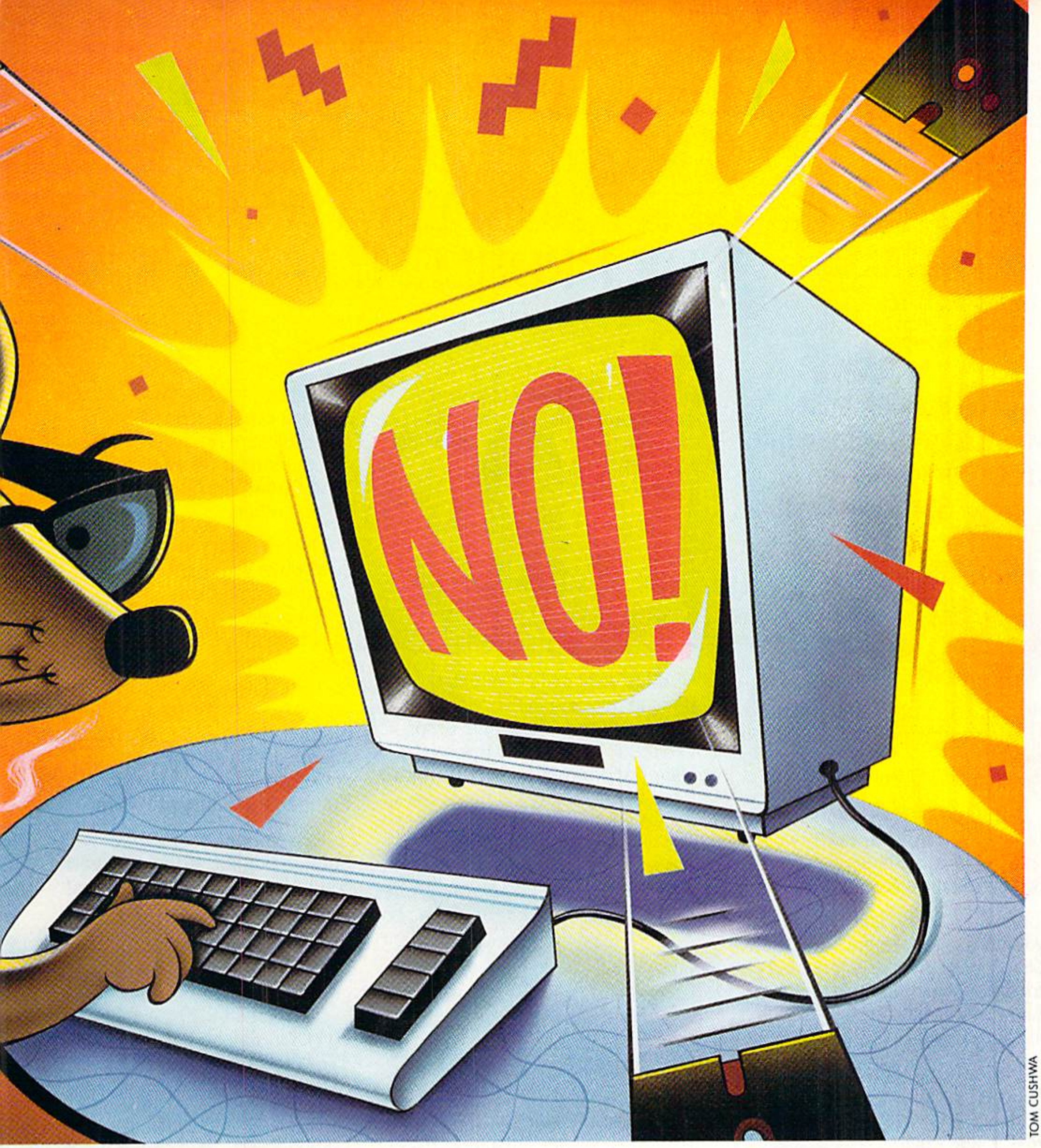
There are different degrees of program "badness." The message "PRESS A KEY TO CONTINUE?" might be momentarily confusing. (Is it asking a question or giving a command? Does it matter which key I press?) Although this example is nearly trivial in comparison to the first two situations, it still represents bad, or at least second-rate, programming.

BY DALE RUPERT

This month we will discuss some of the fine details of the art of programming. If you write programs to be used by others, these are things that you should consider. The "feel" of a program, its helpfulness or unobtrusiveness, and its forgiveness for errors are all characteristics which distinguish the good program from the bad.

USER INPUT

Let's start with some ways for the user to enter data into a program. The most convenient method (from a programmer's point of view) is to use the INPUT statement. A typical example is this:



TOM CUSHWA

```
1 INPUT"PICK A NUMBER FROM 1 TO 1000";N1
```

The computer displays the prompt message defined by the quotation marks, adds a question mark, and then waits for the user to type a response and press RETURN. The entered value is stored in N1.

The advantages of the INPUT statement are that it includes the function of a PRINT statement to display the prompt, and that it provides some error detection. For example, if the user enters a letter instead of a number, the computer displays "?REDO FROM START" and waits until a number has been entered. The main problem with the INPUT statement is that it always adds the question mark after the prompt message, whether the message is a question or a statement.

To avoid the question mark, you might use the following sequence:

```
2 PRINT"PICK ANOTHER NUMBER  ";
3 OPEN 1,0 : INPUT#1,N2 : CLOSE 1
4 PRINT : PRINT N1,N2
```

Line 2 prints the prompt followed by two spaces. Line 3 opens device 0, which is the keyboard, and reads the

IS GETTING THE ANSWER TO SOFTWARE PROBLEMS A BIGGER PROBLEM THAN THE PROBLEM?

Don't stay on hold when there's help online from CompuServe® Software Forums.



The new upgraded version of your software locks up. And every time you reboot, you get stuck in the same place in the program.

You've chucked the manual, because you've done exactly what it tells you to do six times already. So you call the software company.

Now you spend half a day beating your head against a brick wall of busy signals, ranting at recorded messages, hanging around on hold. And you still don't get the solution to your problem.

Meanwhile, progress is stopped and your profits are dribbling away. But wait. There's help...



Several prominent, progressive software publishers recognize this problem, and working with CompuServe, have developed a solution—CompuServe Software Forums.

Now you can go online with experts from the companies that produced your software and get prompt, written answers to your specific problems. You can even talk with the actual software developers.



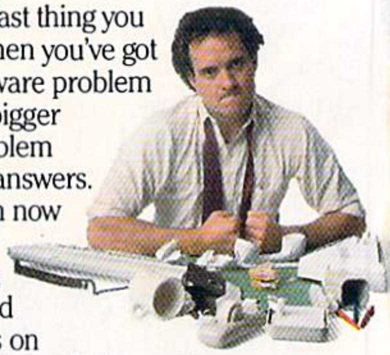
Aldus®, Ashton-Tate®, Autodesk®, Borland International®, Creative Solutions®, Digital Research®, Living Videotext®, Lotus® Inc., Microsoft®, MicroPro®, Misosys Inc.® and Software Publishing® all have CompuServe Software Forums. And we keep adding more.



CompuServe's large subscriber base also puts you in touch with thousands of other, often more experienced, users of the same software. You'll find they can give you lots of creative ways to get the most out of your software.

And software forums are the best way to learn about product updates, new product announcements, new ways to expand the uses of your software, and offer free uploads of your own programs.

Our online electronic magazines frequently publish software reviews. And you can find help for many other software products in our other computer-related forums for IBM®, Tandy®, Atari®, Apple®, Commodore®, TI® and others.



The last thing you need when you've got a software problem is a bigger problem getting answers. So, from now on, get prompt, informed answers on CompuServe Software Forums.

To buy your CompuServe Subscription Kit, see your nearest computer dealer. Suggested retail price is $39.95.



To order direct or for more information, call 800-848-8199 (in Ohio, 614-457-0802).

If you're already a CompuServe subscriber, just type GO SOFTWARE at any ! prompt.

CompuServe®

Information Services, P.O. Box 20212
5000 Arlington Centre Blvd., Columbus, OH 43220

An H&R Block Company

Reader Service No. 270

value entered by the user. The cursor remains on the input line after the user presses RETURN, so the first PRINT statement in line 4 is necessary to drop to the next line.

The disadvantages of the INPUT# statement are that the prompt must be separately printed, and, more important, that there is no built-in error recovery. If the user enters a letter instead of a number in line 3, the program stops dead with a "?FILE DATA ERROR" statement.

A solution to the possible input error is to specify a string variable rather than a numeric one, as in the following example:

```
5 PRINT"GIVE A THIRD VALUE  ";
6 OPEN 1,0 : INPUT#1,N3$ : CLOSE 1
7 N3=VAL(N3$)
8 PRINT
9 PRINT "AVERAGE VALUE IS"; (N1+N2+N3)/3
10 N1$=STR$(N1) : N2$=STR$(N2)
11 ND=LEN(N1$)+LEN(N2$)+LEN(N3$)-3
12 PRINT"TOTAL NUMBER OF DIGITS IS";ND
```

Line 6 accepts any keyboard input (up to the first comma, colon, or RETURN) and assigns it to N3$. To use the input numerically, the VAL function in line 7 converts it from a string to a number. If the user actually enters a letter instead of a number, N3 will have the value 0.

Sometimes both a numerical and a string representation of a number are required. Line 10 shows how to convert the two numerical inputs into their string equivalents. Line 11 adds the number of digits in the three quantities. Three is subtracted, since the string representation of each number includes a leading space character for positive numbers or a minus sign for negative numbers.

It is possible to read all three values with a single INPUT statement of this form:

```
INPUT"WHAT THREE VALUES"; N1,N2,N3
```

The user may enter the values separated by commas or by pressing RETURN after each one. In the second case, the computer displays double question marks for each remaining input.

There are certain situations where this multi-variable form is satisfactory, but in general there is less chance for confusion if a separate INPUT statement and prompt is used for each variable to be entered. Consider the effect on a first-time user from these two sequences:

```
INPUT"WHAT ARE THE TWO NUMBERS"; X,Y
```

or

```
INPUT"WHAT IS THE FIRST NUMBER"; X
INPUT"WHAT IS THE SECOND NUMBER"; Y
```

When a novice user is faced with the input "WHAT ARE THE TWO NUMBERS?", his first questions are usually "How do I enter two numbers? Are they separated by a space, or a comma, or a RETURN, or what?" If he chooses the RETURN, he is then faced with the less-than-reassuring prompt "??". Should he now try to reenter both numbers or only the second? Who knows?

The second sequence generates separate prompts "WHAT IS THE FIRST NUMBER?" and "WHAT IS THE SECOND NUMBER?" These are both clear for anyone familiar at least with the concept of typing a number and pressing the RETURN key. If your program is for the absolute beginner, you might precede the two INPUT statements with a PRINT statement prompt such as "AFTER TYPING EACH NUMBER, PRESS THE <RETURN> KEY."

GETTING KEYSTROKES

Other commands for reading keyboard input include GET and GETKEY. GETKEY is valid only for the C-128. They are useful for single keystroke responses without requiring the user to press the RETURN key. This characteristic can be a mixed blessing.

It is nice not to be forced to press the RETURN key after typing "Y" in response to "Do you want to continue (Y/N)?" as in the following example:

```
14 PRINT"DO YOU WANT TO CONTINUE (Y/N)?"
15 GET K$ : IF K$="" THEN 15
```

On the other hand, if the user has been required to press RETURN after other responses throughout the program, through force of habit he may press "Y <RETURN>" here as well. This is not disastrous if your program is properly written, as we shall see.

To increase the odds that the user does not press RETURN after press "Y" for a GET or GETKEY instruction, make sure that something happens immediately after the key is pressed. Quickly clear the screen, or present the next prompt, or do whatever is appropriate, but remember that instant feedback is the key to preventing unwanted RETURNs.

Since you cannot guarantee that the user won't press an unnecessary RETURN, your program must properly dispose of such occurrences. The best way is to empty the keyboard buffer just before issuing the next prompt. Unwanted keystrokes are tossed into the bit-bucket. Put these statements before line 14 to clear the buffer:

```
13 GET JUNK$ : IF JUNK$<>"" THEN 13
```

This line is executed until there are no more keystrokes in the buffer. Any previous RETURNs, for example, are flushed out before the prompt line 14 is displayed.

There are other ways of clearing the keyboard buffer, but they involve POKEs into machine-dependent locations. If your program might run on more than one type of computer, it is best to avoid such tactics. Line 13 works on any Commodore computer.

Line 15 may be changed for the C-128. It becomes simply

```
15 GETKEY K$
```

The GETKEY statement causes execution to pause until a key is pressed, unlike GET which takes a keystroke from the buffer only if one is waiting there. A disadvantage of GET and GETKEY is that the cursor vanishes and the user's keystroke is not displayed unless the program adds a PRINT statement to show it.

DEFAULT VALUES

Often a program can anticipate a response from the user. In that case, the computer should generate the response for the user and save him some keystrokes. For example, in this averaging program, the computer will loop back for more data until the user presses "N":

```
20 N=N+1
30 PRINT"ITEM# ";N
40 INPUT"WHAT VALUE";V
```

THE LOWEST PRICES — THE BEST SERVICE

ELECTRONIC ONE*

PHONE LINES OPEN 10-6 E.S.T. M-F

CALL (614) 864-9994 • P.O. Box 13428 • COLUMBUS, OHIO 43213

commodore

HARDWARE

C128 COMPUTER	269.99
64C COMPUTER	179.99
1541C DISK DRIVE	189.99
1902A RGB MONITOR	279.99
MPS 1200 PRINTER	249.99
1802 COLOR MONITOR	179.99

PRINTERS

STAR NX10	239.99
STAR GEMINI II	239.99
EPSON LX86 (NEW)	229.99
PANASONIC 1092	319.99
PANASONIC KX3131	269.99
SEIKOSHA SP1000 VC	179.99
STAR SO 10	319.99
STAR SR 10	459.99
STAR 1210	189.99

MISC. HARDWARE

TYMAC "CONNECTION" INTERFACE	39.99
XETEC JR. INTERFACE	39.99
XETEC SR. (8k BUFF)	56.99
MESSENGER MODEM	36.99
COMM. 300 BAUD MODEM	59.99
COMM. 1200 BAUD MODEM	149.99
AVATEX MODEM	76.99
AVATEX (HAYES) MODEM	124.99

MONITORS

SCOTT 13" TV-MONITOR	259.99
1902A RGB	
SAKATA 13" COLOR	149.99
SAMSUNG 14" COLOR	149.99

COMMODORE UTILITY SOFTWARE

PRINT SHOP	29.99
PRINT SHOP COMPANION	24.99
GRAPHIC LIB	14.99
PRINT MASTER	26.99
PARTNER 128	46.99
DATA MANAGER 128	46.99
WORD WRITER 128	46.99
SYLVIA PORTER	46.99
MCIROSOFT MULTIPLAN	29.99
BETTER WORKING SPREAD SHEET	29.99
BETTER WORKING FILE & REPORT	29.99
PAPER CLIP	37.99
PAPER CLIP W/SPELL	44.99
PERFECT FILER	26.99
EASY SCRIPT	29.99
FAST LOAD	26.99
MACH 5	24.99
MACH 128	27.99
SPELL WIZARD	19.99
POCKET WRITER	26.99
POCKET PLANNER 128	26.99
POCKET FILER 64	26.99
JANE	36.99
GEOS	39.99
NEWS ROOM	34.99

SUPER CHRISTMAS SOFTWARE SALE

ZORK 1	6.99
ZORK 2	6.99
ZORK 3	6.99
KICKMAN	3.99
ULYSSES	6.99
DINOSAUR DIG	6.99
DR. SEUIS	7.99
FISH METIC	4.99
DUCKS AHOY	4.99
ALF	3.99
UP FOR GRABS	3.99
SEA HORSE	6.99
LOGIC LEVELS	4.99
FISHER PRICE MUSIC	9.99
ALPHABET ZOO	3.99
WEBSTER WORD GAME	3.99
JUKE BOX	3.99
LEARNING W/LEEPER	4.99
FRACTION FEVER	3.99
FACE MAKER	3.99
MR. ROBOT	3.99
MATCH BOXES	3.99
OIL WELLS	4.99
THRESHOLD	4.99
LUNAR LEEPER	4.99
KID GRID	4.99
DIG DUG	4.99
CROSS FIRE	4.99
SAMMY LIGHTFOOT	5.99
COSMIC LIFE	3.99
KIDS ON KEYS	3.99
MR. KOOL	3.99

SUPER CHRISTMAS SOFTWARE SALE

EASY FINANCE I	3.99
EASY FINANCE III	3.99
EASY FINANCE V	3.99
SNAKE MAN	1.99
INTRO BASIC	3.99
RADAR RAT RACE	3.99
BARBIE	8.99
PILOT	3.99
SPEED BINGO MATH	3.99
ARGOS EXPEDITION	8.99
64 DOCTOR	8.99
RAILROAD WORKS	8.99
WEATHER TAMERS	8.99
TUK GOES TO TOWN	6.99
ERNIE MAGIC SHAPES	6.99
MOVIE MUSICAL	6.99
BIG BIRD DELIVERY	6.99
TYPE RIGHT	4.99
CHOPPER MATH	4.99
ARROW GRAPHICS	4.99
JUPITER LANDER	3.99
JUNO FIRST	4.99
BC QUEST FOR TIRES	6.99
GYRUSS	4.99
DECATHLON	6.99
POPEYE	8.99
CRUSH CRUMBLE	4.99
RECIPES	4.99
SCREEN EDITOR	4.99
GRID RUNNER	1.99
ENGLISH 1-8	3.99 ea.
Q-BERT	8.99
FROGGER	8.99
TINKS ADVENTURE	6.99
JAW BREAKER II	4.99

ALL QUALITIES ARE LIMITED

DISKETTES — SALE — 10 PACK

SONY S/S D/D	6.99	5¼"
SONY D/S D/D	8.99	5¼"
MAXELL S/S D/D	7.99	5¼"
MAXELL D/S D/D	9.99	5¼"
NASADA D/S D/D	7.99	5¼"
3M S/S D/D	10.99	5¼"
PRECISION D/S D/D	7.99	5¼"
BONUS D/S D/D	7.99	5¼"
ELEPHANT S/S D/D	7.99	5¼"
ELEPHANT D/S D/D	8.99	5¼"
GENERIC S/S D/S	13.99	3½"
VERBATUM S/S D/D	13.99	3½"
MAXELL S/S D/D	15.99	3½"
SONY D/S D/D	19.99	3½"
CENTECK (COLOR) S/S D/D	19.99	3½"
DISK CASE 5¼" OR 3½"	7.99 ea.	

VIC-20 2.99 YOUR CHOICE

— ALL QUANTITIES ARE LIMITED —

ALL ARE ON CART EXCEPT ULTIMA

ULTIMA (CASS)	2.99	DEMON ATTACK	2.99
SHARK TRAP	2.99	LUNAR LEEPER	2.99
JAW BREAKER	2.99	CREEPY CORRIDORS	2.99
CANNONBALL BLITZ	2.99	CROSSFIRE	2.99
THRESHOLD	2.99	K STAR PATROL	2.99
DEFENDER	2.99	ROBOTRON	2.99
RICHOCHET	2.99	JUNGLE HUNT	2.99
MOON PATROL		MS. PAC MAN	2.99
DIG DUG	2.99	DONKEY KONG	2.99
PAC MAN	2.99	ATLANTIS	2.99
POLE POSITION	2.99	DEADLY DUCK	2.99

We can get most software for your system. Call or write.

JOYSTICKS

ATARI	6.99
QUICK SHOT 1	5.99
QUICK SHOT 2	7.99
QUICK SHOT 4	9.99
GEM STICK	6.99
UNITE	5.99
EPYX 500XJ	13.99
BOSS	11.99
BAT	16.99

RIBBONS

NX10	7.99
SEIKOSHA	8.99
SG10	2.99
SG10 (COLOR)	3.99
1525	7.99
801	7.99
1526	7.99
LX80	7.99
PANASONIC	7.99
PRO WRITER	6.99

VIDEO GAMES

ATARI 2600 GAME SYSTEM	39.99
ATARI 7800 GAME SYSTEM	79.99
INTELLIVISION (REFURBISH)	19.99
NINTENDO	119.99
SEGA	89.99

CALL FOR COMPLETE CATALOG FOR ALL GAME SYSTEMS

SOFTWARE

KORONIS RIFT	14.99
EI DOLON	14.99
RESCUE FRAC	14.99
COMBAT LEADER	12.99
COMPUTER BASEBALL	12.99
EAGLES	12.99
FORTRESS	12.99

SOFTWARE

WORLD GAMES	19.99
GEM STONE WARRIOR	12.99
KUNG FU-FIST	14.99
KUNG FU STICKS	14.99
TRINITY	19.99
PERRY MASON	14.99
ACE OF ACES	18.99

SOFTWARE

PINBALL CONSTRUCTION	9.99
ARCHON	9.99
FOOTBALL	9.99
HARD HAT MAX	9.99
SUPER BOULDER DASH	9.99
ONE ON ONE	9.99
HEART OF AFRICA	9.99
7 CITIES OF GOLD	9.99

SOFTWARE

MAIL ORDER MONSTER	9.99
FLIGHT SIM II	29.99
JET	26.99
INDOOR SPORTS	18.99
HIGH ROLLERS	18.99
MICRO LEAGE BASEBALL	24.99

HOW TO ORDER: CASHIER CHECK, MONEY ORDER, MASTERCARD* OR VISA* (ADD 4% FOR CHARGE CARDS) . . . NO PERSONAL CHECKS . . . NO C.O.D.'S . . . SHIPPED U.P.S. . . . ALL PRICES SUBJECT TO CHANGE WITHOUT NOTICE.
SHIPPING: ADD $3.00 ON ALL ORDERS UNDER $100.00 . . . ADD $5.00 ON ALL ORDERS OVER $100.00. ACTUAL FREIGHT CHARGED ON MULTIPLE ORDERS.
INTERNATIONAL: ACTUAL FREIGHT CHARGED ON ALL ORDERS OUTSIDE THE CONTINENTAL UNITED STATES INCLUDING A.P.O.
POLICIES: NO RETURNS WITHOUT A RETURN AUTHORIZATION . . . NO RETURNS UNLESS DEFECTIVE. ALL DEFECTIVES WILL BE EXCHANGED . . . NO EXCEPTIONS. PLEASE SPECIFY . . .

CALL OR WRITE FOR FREE CATALOG

CALL ELECTRONIC ONE (614) 864-9994 — P.O. BOX 13428 COLUMBUS, OHIO 43213

```
50 SUM=SUM+V
60 K$="Y" : INPUT"ANY MORE DATA (Y/N) [Y
]"; K$
70 IF K$="Y" THEN 20
80 IF K$<>"N" THEN 60
90 PRINT"AVERAGE IS"; SUM/N
```

Line 60 displays the prompt "ANY MORE DATA (Y/N) [Y]?" The input choices are shown within parentheses (Y/N) and the default value is shown within square brackets [Y]. (You might prefer to use reverse video for the default rather than the square brackets.) This means that user need only press the RETURN key to select the default response "Y" in order to enter more data. Of course, "Y <RETURN>" would also be accepted.

Here we are dealing with subtleties. Run this program several times to see how it "feels." Next, see the result of eliminating the default value. Change the K$="Y" in line 60 to K$=" ".

Now the user must explicitly enter "Y" to continue. Run this program a few more times to see the difference the lack of a default value makes. If you had 50 numbers to average, a savings of 50 "Y" keystrokes would be quite welcome.

We can make this program even easier to use by eliminating all additional keystrokes. Try this program to see the improvement.

```
100 PRINT"JUST PRESS <RETURN> WHEN DONE"
110 N=N+1
120 PRINT"ITEM #";N
130 V$=""
140 INPUT"WHAT VALUE";V$
150 IF V$="" THEN N=N-1 : GOTO 180
160 SUM=SUM+VAL(V$)
170 GOTO 110
180 PRINT"AVERAGE IS";SUM/N
```

For novice users, the prompt in line 100 should be expanded or included in line 140's prompt. As before, the user presses RETURN after each data item. But now, once the last data item has been typed, the RETURN key is simply pressed twice.

Run this program for a while and see if you agree that a little additional programming effort made the program significantly better.

Notice that the value of N is corrected in line 150 since it was already incremented after the user entered the last data item. A string variable V$ is used for the input so the program can tell when the RETURN key by itself has been pressed. In that case, V$ retains the null value assigned to it in line 130. (To appreciate this concern,

try rewriting the program using a numeric variable instead of V$.)

To put finishing touches on the program, C-128 users might modify the PRINT statement in line 180 as follows:

```
180 PRINT"[UP][UP]" CHR$(27) "@ AVERAGE
IS"; SUM/N
```

This moves the cursor up two lines and uses the Escape-@ sequence to delete to the end of the screen, thereby eliminating the unused Item # prompts. C-64 users could create a similar effect by adding another PRINT statement at the beginning of line 180 to give:

```
180 PRINT"[UP][UP][10 SPACES]" : PRINT"A
VERAGE IS"; SUM/N
```

DEFAULT FINALE

We have barely scratched the surface of program esthetics and the user interface. As a final example of an input routine which goes one step further to provide "user friendliness," refer to the program *Default Prompter* on page 102. It is based upon the filename prompt routine in a commercial word processor. When the user presses the "Save File" key on that word processor, the word processor asks for the filename with which to save the document. It anticipates and displays the user's most likely response, which is the previous filename under which the document was saved.

If the user wants to resave the document with the same filename, he merely presses RETURN. The user may prefer to change the last few characters of the filename to indicate a different version of the document, such as from "FILE#01" to "FILE#02" for example. In that case, the user presses the DELETE key the proper number of times and then types the new characters.

The unusual aspect of this routine is that it "senses" when the user wants to use an entirely different filename. If the user presses any key other than DELETE or RETURN, the program erases the default filename and displays the keystrokes as the user enters them.

Run the program and try the various possibilities. Of course the routine is not limited to inputting filenames. Change PROMPT$ in line 10 and DFLT$ in line 20 for your own applications. Your program can access this routine at line 70 after lines 10 through 50 have been executed. You will probably change line 430 to RETURN if you use a GOSUB from your main program to this routine.

FL$ stores the input string (filename) and LF is the length of that string. BS$ is the DELETE character, CR$ is the RETURN character, and CSR$ is a cursor character followed by a Cursor Left. Each keystroke is stored in K$. The subroutine at line 200 reads the keyboard and filters the keystrokes so that only the RETURN, DELETE, or alphanumeric characters are accepted. The subroutine at line 500 handles the case in which the user starts by typing an alphanumeric character. The default filename is erased and FL$ is given the value of that first character.

Any additional alphanumeric keystrokes are handled by the routine at line 140 in which FL$ is built up character by character. The subroutine at line 300 handles backspacing with the DELETE key. The routine at line 400 erases the cursor and prints the resulting filename in FL$ once the RETURN key has been pressed.

"No big deal" is what some of you may say to all this. In a sense you are right. This is a very small portion of a very large and complex word processing program. It is, however, precisely the type of detail that makes the word processor a pleasure to use (and also a perennial best-seller).

Certainly not every program you write warrants a two-hour programming effort to include a "friendlier" input prompt routine. The important thing to remember is to look at your program from the user's point of view as you are writing it. A program's responsiveness, helpfulness, and ease of use are all part of the "user interface." Anyone can write a bad program by not really trying...and many people do. By putting a little more effort and consideration into the user inteface, anyone is more likely to write a good program.□

SEE PROGRAM LISTING ON PAGE 102

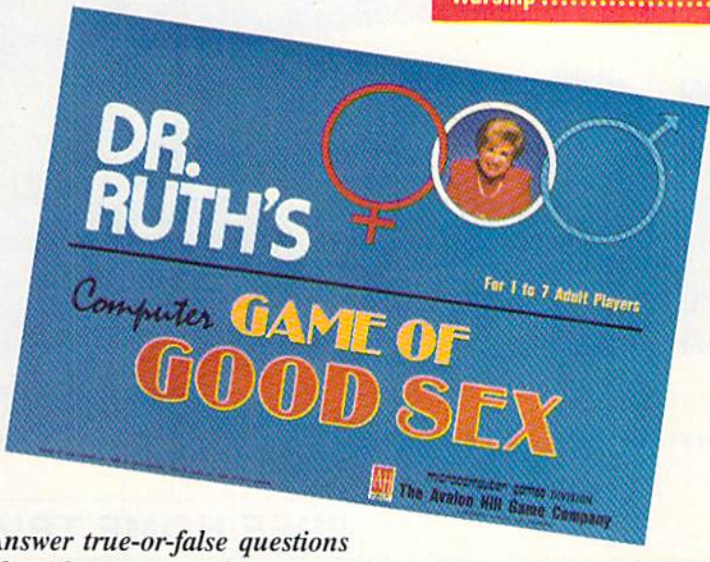
FUN FOR ALL

Multiplayer Games for the Commodore 64/128

By Arnie Katz and Bill Kunkel

Say "computer game" to most people, and they immediately think of a solitaire contest. The image of the solo computerist sitting in front of the monitor communing with the screen is etched in our consciousness.

In truth, most leisure programs for home systems are meant to be played by an individual. This tradition got started early in the history of computer entertainment. The first wave of microcomputers had small viewing screens and required players to enter their commands through the keyboard. This made it difficult for more than one person at a time to interact with the machine comfortably. A little later, the popularity of translations of coin-op games for the home market and the dominance of the Apple II+, which has only one joystick, fed this bias toward one-player games.



Answer true-or-false questions about love, sex, and human relationships. *READER SERVICE NO. 230*

Two-player computer games are much more common than multiplayer ones. Most sports simulations and many wargames include a head-to-head option, but few computer games of any type permit three, four, or more to compete. Even *Word Challenge* (Hayden), *Auto Duel* (Origin), and other software titles based on non-electronic multiplayer boardgames are generally restructured for one, or at most two, players when they are revised for home computers.

Ozark Softscape is one of the few design houses which has focused on creating computer games for groups of two or more. Its *M.U.L.E.* (Electronic Arts) allows up to four human participants to struggle against the environment and each other to establish an economic empire on a newly founded space colony.

This foray into futuristic economics illustrates the command control problems which always bedevil multiplayer computer games. The first two participants in a round of *M.U.L.E.* employ the joysticks to perform all functions. Without touching the keyboard, participants can select parcels of land and set the buying and selling prices in the real-time commodity auction. This makes for a relatively smooth-playing game, even though *M.U.L.E.* demands sophisticated strategic planning from outer space entrepreneurs.

A problem arises with the introduction of the third and fourth financiers. Since there are only two joystick ports on a Commodore 64 or 128, the additional players must employ the keyboard to direct their onscreen surrogates. This creates traffic congestion at the console, as two sets of hands grope for the right keystrokes. And since two of the players have to sit right in front of the screen, those inputting orders through the joystick often have trouble following the many details which flash across the display monitor.

Robot Rascals (Electronic Arts), Ozark Softscape's newest creation, eliminates the unpleasant jostling, because it avoids situations in which more than one participant needs control over the screen at the same time. In this lighthearted scavenger hunt, one to four players move their robot rascals around the planet Laustenfownd in a hunt for valuable and powerful artifacts.

The multiplayer capability is not the only unusual aspect of *Robot Rascals*. This is a hybrid design which supplements electronic action with two packs of cards. The "luck" and "item" decks greatly increase interaction among the players in a way which would be difficult to achieve in a totally computerized contest.

After participants select one of the 10 charmingly drawn robots, they receive three or four item cards, depending on the desired length of game.

All robots can scan for items, steal prizes from rivals, and erect shields to protect their booty. Each round,


COMMODORE
C-64 COMPUTER
$99
*WITH PURCHASE OF SPECIALLY PRICED SOFTWARE PACKAGE
DISK DRIVE
1541 COMMODORE
$139
MODEMS
300 BAUD
$28
$98
1200 BAUD
HAYES
COMPATIBLE
COMPUTER
WITH GEOS
$168*
*WITH PURCHASE OF OF 1541C DISK DRIVE
C-64-C
PRINTER
803-C
$138
COMMODORE
MONITOR
COLOR COMPOSITE
$138
MONOCROME SCREEN
$59
POWER SUPPLY
C-64
COMMODORE
$39
JOY STICKS
$9
CABLE TV
NO PAY TV? CONVERTERS/ DECODERS
• JERROLD
• OAK
• HAMLIN
RADAR DETECTOR
RETAIL $249
SUPERHET
$78
FREE HOME TRIAL
QUICK DELIVERY
C.O.D.
SCHOOL P.O.'s ACCEPTED
Reader Service No. 256
PRO-TECH-TRONICS
6870 Shingle Crk. Pkwy. #103
Minneapolis, MN 55430
(612) 560-6603

a robot gains a fresh supply of energy which it expends by moving and performing other activities. It is possible to handicap a better player's robot by limiting its energy supply.

Robot Rascals has three levels of play: beginner, standard, and advanced. Even young children will be able to participate at the easiest level, which makes objects easier to find and hold. The advanced rules are a little more complicated, but *Robot Rascals* is perfect for a family gaming night or light party entertainment.

The "luck" cards keep *Robot Rascals* constantly surprising and exciting. Drawing "force a swap," "pass the trash," or "steal a card" can turn a game topsy-turvy in an instant.

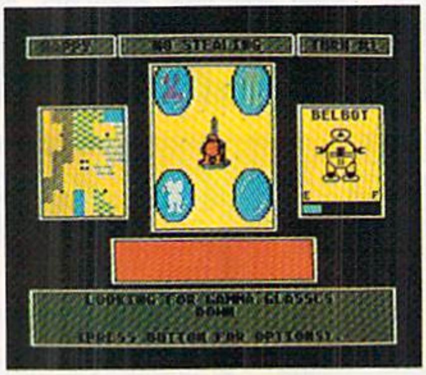
There are four types of cards in the "item" deck: good, bad, neutral, and special. Artifacts like the Digital Donut and the Holograph Hat don't affect the robots' operation, but snagging the Helpless Handbag (no shields) or the Action Anchor (no movement) is a mixed blessing. On the other hand, locating the Dynamo Diamond (more energy) or the Velocity Vitamin (faster movement) makes it easier for the robot rascal to complete the scavenger hunt.

Special cards exert an even bigger effect on the course of the game than the "luck" deck. The most ingenious is the "Killer Kard." It has no matching item, so a player must pass it to an opponent in order to win!

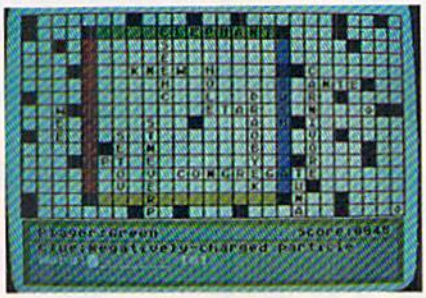
Robot Rascals is well-suited to group play. The onscreen images are large and easily distinguished. Since participants take turns entering commands with the joysticks, there is no battle for the keyboard to take the edge off the fun.

Most of all, *Robot Rascals* is a sensitively designed *game.* Dan Bunten and his Ozark Softscape teammates have always produced well-balanced, satisfying works like *Seven Cities of Gold* (Electronic Arts), and *Robot Rascals* is worthy of the outfit's sterling reputation.

If *Dr. Ruth's Computer Game of Good Sex* (The Avalon Hill Game Company) depended on its play-mechanics or graphics to generate interest, they'd have to round up players at gunpoint. On the other hand, the theme guarantees that computerists will have no trouble enticing one to seven people into trying this sexually oriented trivia quiz.



Robot Rascals: *suited to group play.*
READER SERVICE NO. 231



Word power is a must in Crosscheck.
READER SERVICE NO. 232

Players take turns trying to answer a set of four true-false questions about love, sex, and human relationships. Any contestant who gets at least three out of four correct gets a bonus multiple-choice question drawn from the clinical files of noted sexologist Dr. Ruth Westheimer.

After two rounds of play, the two top scorers go head-to-head to decide the winner. Only the first to answer four true-false questions and a bonus multiple-choice gets credit, and the highest total earns the victory.

The scoring system credits both speed and accuracy. A player gets the number of points showing on the countdown clock for a correct response. A wrong answer deducts half the value on the onscreen counter from the gamer's running total. Sometimes it's better to skip a query which draws a blank, because there's no penalty for passing.

Fans of crossword strategy contests like *Scrabble* will adore *Crosscheck* (Intellicreations). This likable electronic boardgame for up to four word-wise computerists requires participants to display sound strategic planning as well as a good vocabulary.

The program offers two different views of the game board. A close-up of the center of the board is the default option. The joystick scrolls the cursor around the board to facilitate the placement of new words. A player can also access an overview of the whole board with a keystroke.

The object in the standard version is to create a chain of words between the starting position on the side of the diamond to a home base in the corner of the board. *Crosscheck* can also be played for high score or against a preselected time limit.

Each player, in turn, presses the space bar to stop the electronic 10-sided die displayed on the screen. The program then presents a one-line clue for a word with a number of letters equal to the die-roll. The gamer types in an answer, which *Crosscheck* rules correct or incorrect. When a player enters a different word than the program expected, an onscreen prompt inquires whether the player's word is a synonym. If it is, the game gives credit for it.

Once a player correctly identifies a word, he or she places it anywhere on the board where it can be attached to an existing word. The positioning of the words is as crucial as unraveling the clues. With a little forethought, a player can wind a trail of words from the starting diamond to the target corner before his opponents reach their own goals.

While elaborate audiovisual effects would certainly enhance *Crosscheck,* it needs no fancy trimmings to thoroughly delight word game fans. Not only is it entertaining, but it may even help build word knowledge.

If you customarily spend hours alone gaming against your Commodore, now is the time to break out of voluntary solitary confinement. The multiplayer programs described in this article can add a new dimension to your computer entertainment. ☐

UNDER CONSTRUCTION

ULTIMATE WIZARD

Building Playfields for the Action-Strategy Hit

By Ted Salamone

A lot of the enjoyment in Electronic Arts' enhanced reissue of Progressive Peripherals & Software's previously released (and highly successful) *Wizard* derives from the playfield construction module.

Ultimate Wizard, the new title for this climbing and jumping extravaganza, blends old and new elements in a virtually irresistible combination. The 40 prebuilt playfields furnish hours of fun, but experienced *Ultimate Wizard* addicts will want to try their hand at creating customized screens.

Thanks to the construction set capabilities, every game can be different. Selecting "Construction" from the menu loads the tool box, an electronic magical mystery tour.

The screen then displays a blank screen with a cursor in the upper left corner and a parts box laid out in a single row at the bottom. This is the control board from which the user can design, save (to a data disk), and play original works.

A journey of a thousand miles begins with a single step, and that's good advice for aspiring alchemists. It is far better to learn the basics of playfield design and construction with a relatively modest project than to attempt to produce the ultimate *Ultimate Wizard* screen on the first try.

The best way to start is to imitate and revamp the layout of existing climbing-and-jumping contest like *Jumpman* (Epyx) and *Lode Runner* (Broderbund). Another good source of inspiration is *Ultimate Wizard's* own playfield library.

Reworking favorite screens from other games, particularly titles which don't have screen editing capabilities, is a great way to "do the designer one better." Just because the theme is different, magic as opposed to jungles or skyscrapers, doesn't mean the play-action can't be as thrilling.

Working on some topflight playfields before creating one from scratch also provides a necessary insight into the aesthetics of game design. Almost anyone can master the mechanics of the construction module in a sitting. The key factor is not how many play-features the user crams onto the screen, but rather how cunningly he or she arranges them.

Altering *Ultimate Wizard's* original screens is a snap. Just remember to save them under another number so the program isn't confused during runtime. (Unless a notch is cut in the master disk, there is no way to overwrite the original screens.) *Ultimate Wizard* expects to see custom screens numbered 40 and above, so don't invite trouble by overlooking such a minor detail.

After the computerist takes apart some professional playfields and puts them back together, it's time to remove the training wheels and go it alone. Creating completely original screen layouts, traps, tricks, and antics is the biggest, and most enjoyable, challenge.

Work This Way

Gather ideas. Study the original *Ultimate Wizard* screens during actual play and the self-running demo. Read the playing tips for ways to make the screens tough, but not overwhelming and unforgiving. Review other games and add a personal touch.

Before the first element is placed, the user should become thoroughly familiar with the game editor. The resulting playscreen will be much better if the designer understands all the parts in the tool box, including their idiosyncracies and interactions.

Don't be afraid to experiment with junk screens. Clearing the screen banishes all mistakes to limbo. If the computerist makes layouts, places monsters, and adds spells when and where the mood strikes, the fruitful combinations will practically jump off the monitor. Any valuable discoveries can be noted for inclusion in more carefully planned playfields.

When concocting a new playfield, the best approach is to begin at either the top or bottom. Such screens are easier to revise and debug than those which are created haphazardly or which expand from the vertical centerline.

Once the computerist positions the platforms, treasures, ropes, ladders, and obstacles, a dry run is a good idea. This is the place to catch dead ends, lack of territorial continuity (places where the wizard can't cross without consistently plunging to his doom), and other trouble spots.

Correct these before adding monsters, spells, and background colors. In the beginning it's best to stick with default monster settings and simple treasure layouts. Once the basics are mastered, change monster images (sprites) while retaining the creature's original attributes and add treasure matrices.

Changing the appearance without altering the function of a monster is a handy shortcut. Monster manipulation allows the constructor to turn a rat into a ghost without worrying about play-balance considerations.

All 16 colors are available, though cyan colored creatures pose no threat to the wizard. With practice you can transform one denizen of the dark and dank into another right onscreen.

In the matrix mode, magic masters create tripwires. Endowing the area surrounding a treasure with a special property makes possible all sorts of tricks and treats. This option lets you roast him or reward him. Among possible nasty surprises: Make the escape key appear only when a certain treasure is taken; have a deadly pit appear when the onscreen surrogate snags a prize; or burn the fellow in the pointy hat to a crisp when he takes the wrong one.

Playtest each screen. Load the game routine, call "Customize" from the menu, and have a go at it. Work through as many screens as possible

before returning to the editor for fine tuning. Repeat until perfected.

The Official Apprentice's Guide

Even apprentice sorcerers get some counseling before being sent to stir the cauldron. The prime directive is: Don't make screens too busy. Keep the special effects down to a minimum. Overuse confuses play-action and reduces the impact of each individual feature. For instance, though the program allows three sliding stairs to be placed on each screen, don't use more than two. Add trap doors, elevators, and ladders (suspended over fire pits, maybe) for variety.

Match spells to monsters to liven up the chase. Throw in a few screens without spells or without deadly spells as a change of pace. Remember, a lot of the impact of a multi-screen contest comes from the juxtaposition of dissimilar playfields.

Setting the platforms, ladders, and ropes to the same color as the background is devastating. It renders them invisible to you, but not the monsters. This gambit is not recommended for the faint of heart.

The bonus bar is adjustable, but the wise designer will resist the temptation to slow it down so much that a leisurely stroll around the screen still nets a sizeable bonus. The function of the time limit is to force the player to think fast and keep moving.

The "Help" menus, reached through the function keys, are the computerist's staunchest ally. F1 accesses construction command keys, and f3 unlocks the mysteries of the monster and treasure modes. F7 displays the disk directory, useful for tracking the last custom screen number. (Note: the manual incorrectly lists these keys.)

The easiest way to organize your creations is with multiple data disks. Disk "A" can have 60 screens, Disk "B" another 60, etc. Rearrange the order of favorite screens on different disks to add yet another wrinkle to playability.

Above all, don't forget a key to unlock the portals.

The Dark Side

There are a few typos in the manual, but they are easy to detect. More insidious are the gyrations needed to test and refine the customized screens. There is no real-time test mode in the construction module. The user must reload the program to test a screen, and reboot again to reinstall the construction module. For this reason, it's best to design and test a number of screens at once.

A few more features would make life easier for apprentice designers. *Ultimate Wizard* needs a cursor location (row/column) display. Also, there is no way to customize the audio.

WizWords

These faults are, at most, petty annoyances. *Ultimate Wizard* is an addictive action-strategy test which goes beyond its inspiration in a number of areas. Its construction capabilities add new dimensions and insure a never-ending supply of (mis)adventures. □

THE MOVIE MONSTER GAME
Epyx
Commodore 64
Disk; $39.95

"There are some things Man was not meant to know," the Oriental scientist says in perfect but toneless dubbed English. The music rises, the cameras pan to the rising sun of a brave new day, and the theater curtains close on another Japanese monster movie. Epyx has taken these cinematic festivals of death and destruction out of the movie houses and put them on the home computer gaming screen.

A few years back, Epyx published a game called *Crush, Crumble, and Chomp* for the Apple II family of computers, with subsequent translations for other machines. Despite the crude graphics imposed on the program by the Apple II+'s 48K memory limitation, *Crush, Crumble* insinuated itself into the hearts of more than a few computerists. There's something irresistible about temporarily assuming control of mighty movie monsters.

Unfortunately, it took a lot of imagination to connect the static, simple images used in *Crush, Crumble, and Chomp* with the highly kinetic and visually stunning depictions of menacing creatures in B-movies. *Crush, Crumble* became a cult classic, an underground favorite passed from one knowing gamer to the next.

As computer technology advanced, fans of the game began lobbying Epyx to produce a new version which would take advantage of these improvements in hardware and software. The company definitely deserves kudos for heeding the plea. *The Movie Monster Game* is almost everything the most ardent fans of the earlier title could have desired.

The preamble to the game beautifully evokes the ambience of a movie theater. First the solitaire selects a monster, a city, and a premise for the scenario from a screen which looks like a theater lobby.

There are six monsters: Godzilla, Mr. Maringue, Sphectra, The Glog, Tarantus, and Mechatron. The cities

they can menace are Tokyo, New York, London, Moscow, San Francisco, and Paris. Possible objectives include the destruction of famous landmarks, an attempt to dine on the local populace, a hunt for a monstrous offspring, simple flight for self-preservation, and (a personal favorite) wanton wholesale destruction. Variety-minded players won't quickly exhaust this large number of combinations, and it's certainly fun to play each of them more than once.

Once the selection process is done, the display moves into the theater. The house lights darken, the curtain gently rises, and a series of commercials for other Epyx games and movie candy flicker across the screen.

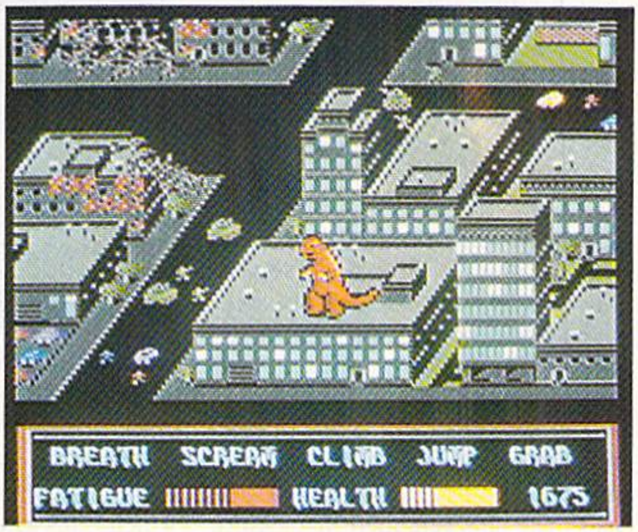
Then it's time for the "feature presentation." A series of text screens explain the monster's origin and outline the facts of the current scenario.

After flipping the disk when prompted, the user sees a psuedo-3-D view of the streets and buildings of the city which is to serve as the locale of the game. The gamer guides the monster through the metropolis with the joystick and presses the action button to employ one of the creature's three special powers.

Controller response varies markedly depending on the monster involved. Those who choose Godzilla should expect a suitable amount of trouble when trying to make the regal reptile run down a street.

A shrinking bar located just below the wide-screen main display records the monster's energy level. Human attacks and the strain of running amok deplete energy, and the creature succumbs when the bar reaches zero.

The life of a crazed creature, even a powerful one like Godzilla, is not free of complication. Armed civilians, tanks, helicopters, and other weapons take their toll on the player's surrogate, and it's a rare creature which achieves its goals, escapes, and lives to destroy another day. Except in the "escape" episode, survival is not really the main objective. The highest scores go to those players who visit the greatest destruction upon the city and its inhabitants.



The Movie Monster Game *allows players to menace one of six cities, with such objectives as the destruction of landmarks, the gobbling up of the citizenry, or plain wanton destruction.* *READER SERVICE NO. 233*

The Movie Monster Game is an unqualified success. The only blemish is Epyx's unaccountable omission of author credits. When a game is this enjoyable, we want to know whom to thank. Now, how about a sequel?

Epyx, P.O. Box 8020, 600 Galveston Dr., Redwood City, CA 94063 (phone: 415-366-0606). *–Arnie Katz*

CHAMPIONSHIP WRESTLING

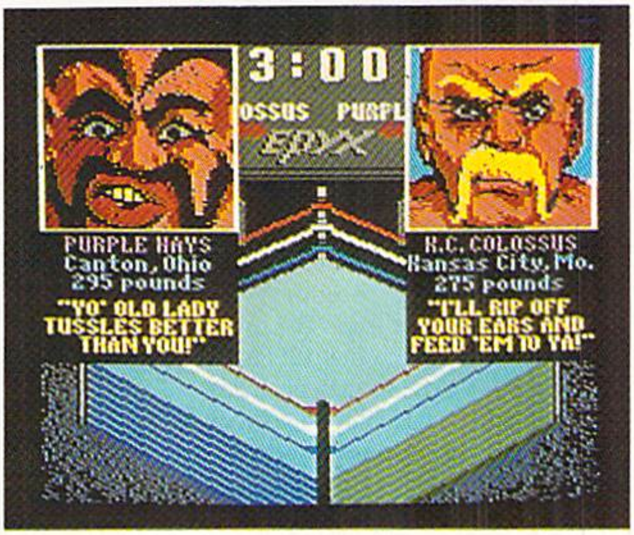
Epyx
Commodore 64
Disk; $29.95-$39.95

This second attempt to bring the sizzle of professional wrestling to the home screen suffers from the same fundamental defect as its predecessor. Both Mindscape's *Bop'N Wrestle* and now Epyx's *Championship Wrestling* try to do too much too quickly. Anyone who can pick up *Championship Wrestling* for the first time, even in the practice mode, and remain off the canvas for more than 30 seconds is either a joystick mutant of some sort or is doing nothing more than running away from the opposition.

The program features 21 different moves, each worth a specific number of points, available to the grappler. Trying to remember which maneuver goes with which joystick position can prove profoundly frustrating.

The user holds down the button to execute a move. Otherwise, the stick controls the movement of the wrestler. When the player's grappler is far enough away from the opponent, pushing the joystick forward while pressing the button causes a flying drop kick. A pull back on the stick results in a spin kick.

At closer quarters, moving the stick forward or back initiates, respectively, a punch or kick. From this point



The computer-controlled grapplers in Championship Wrestling *are so fierce that beginners won't last long enough against them to learn much. Human opponents are better for novices.* *READER SERVICE NO. 234*

on it gets a little complicated. Moving the stick left or right gets the foe into a headlock, and the control scheme is revised to include a new assortment of possibilities.

Championship Wrestling incorporates most of the mat world's more spectacular finishers, including atomic drop, giant suplex, body suplex, pile driver, body slam, airplane spin, and the ever-popular leap off the top turnbuckle. It's even possible to throw the opponent out of the ring!

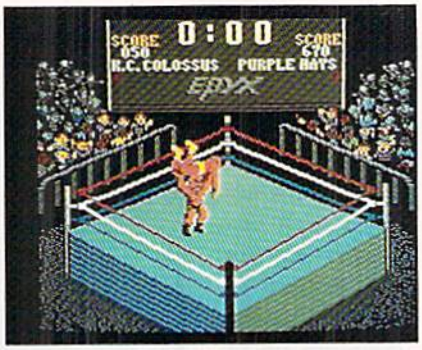
The imaginatively drawn crowd generally reacts badly to having a sweaty mat warrior dumped into their laps. The fans vent their displeasure with pithy comments inside comic strip world balloons.

It is possible to gain some momentum and leverage advantage by learning how to bounce off the ropes. This tactic is not without drawbacks, however. A well-timed bounce can have a devastating effect on the opponent if a move is tacked on at the end, but if the rival wrestler is ready and waiting with a move of his own, a quick three-count could be the outcome.

The grapplers are well-drawn and the action well-animated. The point of view is from slightly above the ring and in one corner. It is fairly easy to see what's happening inside the combat zone, but doing something about it is another matter. The pace of the action is, to say the least, frantic.

In fact, that's the major complaint about the game. By the time the computerist figures out the proper strategy and recalls the combination of joystick actions necessary to enter the maneuver, the opportunity is gone and most likely the match is nearly over.

With most games, it is a good idea to brush up on the skills by working out against a computer-directed opponent before taking on a human foe. With *Championship Wrestling*, exactly the opposite is true. The robot adversary is so fierce that it is hard for a beginner to make the match last long enough to learn much. Novices should compete against a mortally fallible foe before tackling the cold precision of the computer.



Championship Wrestling *includes body slams and other spectacular finishes.*

One good way to enjoy this game is to stage a multiplayer tournament which leads to a climactic title showdown. Each gamer can manage a different wrestler.

The eight wrestlers available are (with hometowns and custom move): K.C. Colossus, Kansas City, Trash Compactor; Purple Hays, Canton, Ghetto Blaster; Colonel Rooski, Moscow, Great Bear; Prince Vicious, Sunnyvale, Vicious Circle; Zantoklow, Unknown, Klaw Hammer; Zeke Weasel, Cowpens, Block and Tackle; The Berserker, Tasmania, Pop-Top; and Howling Manslayer, Indianapolis, Bow and Arrow.

In the competition mode, the computer can control up to seven of these grapplers in a tournament format. The top human scores are saved to disk.

The computer also keeps track of the three-minute time limit for each match. A bar graph under each competitor's name shows how much of his strength remains. The more complex the move, the more strength it requires. The wise manager accumulates a little strength before attempting anything too difficult. Should the grappler run out of strength before finishing a move, he usually is out of the match as quickly as the referee can say one-two-three.

Epyx, P.O. Box 8020, 600 Galveston Dr., Redwood City, CA 94063 (phone: 415-366-0606).

—Rick Teverbaugh

WARSHIP
Strategic Simulations
Commodore 64
Disk; $59.95

It had to happen eventually. So many popular conflict simulations have included utilities to create new scenarios that it was only a matter of time before a construction module became the main focus instead of an added feature.

That trend began with Avalon Hill's *Under Fire.* What that game did for land combat, *Warship* attempts for sea battles between the American and Japanese fleets in the 1941 to 1945 time period.

Having a yen to construct customized scenarios isn't compulsory for enjoying *Warship,* but it helps. The four prepared scenarios (Guadalcanal I and II, Empress Augusta Bay, and San Bernardino) are probably better than any military simulation that could be bought up to about two years ago.



Warship *features four preset scenarios and a do-it-yourself wargame kit allowing the user to define such parameters as battle area, date, fleet composition, and game length.* *READER SERVICE NO. 235*

IF YOU NEED $5,000. . .$20,000 EVEN UP TO $500,000 TO START A NEW BUSINESS OR TO EXPAND AN EXISTING FIRM—THEN READ WHY YOU TOO WILL CALL THIS INCREDIBLE MONEY RAISING

BUSINESS OPPORTUNITY SEEKERS' LOANS MANUAL
"The Small Business Borrower's Bible"

Practically prepares the loan application for you line-by-line...the "proper" way.
All properly prepared applications are processed faster...no red tape!

EVERY LOAN DOLLAR YOU GET YOU KEEP AND USE TO OPERATE YOUR BUSINESS

Guaranteed Loans...Direct Loans...and Immediate Loans are available now!
Most men and women seriously interested in starting their own business are eligible to apply — including those who already own a business and need capital fast for expansion...or to stay afloat...even if they've been flatly refused by banks and turned down elsewhere! Yet, too many never qualify, simply because they do not know how to "properly" prepare the loan application...

In order to help those people applying for these guaranteed and direct loans fill out their loan applications the "right way" our business researchers, with their diligent compilation and effective efforts, have successfully assembled and published a comprehensive, easy-to-follow seminar manual: The Business Opportunity Seekers' Loans Manual, that will **quickly show you practically everything you'll need to know** to prepare a loan application to get federally Guaranteed and Direct Loans.

Here are just **some of the many important benefits** the Business Opportunity Seekers' Loans Manual provides you with:

- **a completely filled in sample set of actual SBA loan application forms, all properly filled in for you to easily follow—aids you in quickly preparing your own loan application the right way. Each line on the sample application forms is explained and illustrated in easy-to-understand language.**
- **fast application preparation procedures for getting loans for both new start up business ventures and established firms.**
- **advises you on how to properly answer key questions necessary for loan approval and in order to help avoid having your application turned down—gives you advice on what you should not do under any circumstances.**
- **what simple steps you take to guarantee eligibility—no matter if you do not presently qualify.**
- **where you can file your application for fastest processing.**

At this point the most important question you want answered is: Just where is all this loan money coming from? Incredible as it may sound—these Guaranteed Loans, Direct Loans and Immediate Loans are indeed available right now — from the best, and yet, the most overlooked and frequently the most ignored and sometimes outright ridiculed "made-fun-of" source of ready money fast capital in America — THE UNITED STATES GOVERNMENT.

Of course there are those who upon hearing the words "UNITED STATES GOVERNMENT" will instantly freeze up and frown and say:

"*... only minorities can get small business loan money from the government!*"

Yet on the other hand (and most puzzling) others will rant on and on and on that

"*... don't even try, it's just impossible — all those Business Loans Programs are strictly for the Chryslers, the Lockheeds, the big corporations, not for the little guy or small companies" etc.*



Still there are those who declare

"*... I need money right now ... and small business government loans take too darn long. It's impossible to qualify. No one ever gets one of those loans.*"

Or you may hear these comments

"*... My accountant's junior assistant says he thinks it might be a waste of my time!" "Heck, there's too much worrisome paperwork and red tape to wade through.*"

Frankly — such rantings and ravings are just a lot of "bull" without any real basis — and only serve to clearly show that lack of knowledge ... misinformation ... and not quite fully understanding the UNITED STATES GOVERNMENT'S Small Business Administration's (SBA) Programs have unfortunately caused a lot of people to ignore what is without a doubt — not only the most important and generous source of financing for new business start ups and existing business expansions in this country — but of the entire world!

Now that you've heard the "bull" about the United States Government's SBA Loan Program — take a few more moments and read the following facts:

- **Only 9.6% of approved loans were actually made to minorities last year**
- **What SBA recognizes as a "small business" actually applies to 97% of all the companies in the nation**
- **Red tape comes about only when the loan application is sent back due to applicant not providing the requested information...or providing the wrong information**
- **The SBA is required by Congress to provide a minimum dollar amount in business loans each fiscal year in order to lawfully comply with strict quotas. (Almost 5 billion this year)**

Yet, despite the millions who miss out — there are still literally thousands of ambitious **men and women nationwide** who are properly applying — being approved — and **obtaining sufficient funds** to either start a new business, a franchise, or buy out or expand an existing one. Mostly, they are all just typical Americans with no fancy titles, who used essentially the **same effective know-how** to fill out their applications that you'll find in the Business Opportunity Seekers' Loans Manual.

So don't you dare be shy about applying for and accepting these guaranteed and direct government loans. Curiously enough, the government is actually very much interested in helping you start a business that will make a lot of money. It's to their advantage — the more money you make the more they stand to collect in taxes. In fiscal 1986, our nation's good old generous "uncle" will either lend directly or guarantee **billions of dollars** in loan requests, along with **technical assistance and even sales procurement assistance**. Remember, **if you don't apply for these available SBA funds somebody else certainly will.**

Don't lose out — now is the best time to place your order for this comprehensive manual. It is **not sold in stores**. Available only by mail through this ad, directly from **Financial Freedom Co., the exclusive publisher**, at just a small fraction of what it would cost for the services of a private loan advisor or to attend a seminar.

For example:

Initially, this amazing Guaranteed and Direct Loans Manual was specially designed to be the basis of a Small Business Loan Seminar — where each registrant would pay an admission fee of $450. But our company felt that since the manual's quality instructions were so ***exceptionally crystal-clear*** *that anyone who could read, could* ***successfully use its techniques*** *without having to attend a seminar or pay for costly private loan advisory assistance services.*

Therefore, for those purchasing the manual by mail, no 3 day class, no course and accommodations are required. And rather than $450 we could slash the price all the way down to just a mere $20 — a small portion of a typical seminar attendance fee — providing you promptly fill in and mail coupon below with fee while this special "seminar-in-print" manual offer is still available by mail at this relatively low price!

Remember, this most unique manual quickly provides you with actual sample copies of SBA Loan application and all other required forms—already properly filled in for you to easily use as reliably accurate step-by-step guides—thus offering you complete assurance that your application will be properly prepared and thereby immediately putting you on the right road to obtaining fast no red-tape loan approval.

GUARANTEE #1

Simply — look over this most effective money raising loan preparation assistance manual for 15 days — and then, if you are not convinced that it can actually help you obtain the Business Loan you need right away — just return it for a full and prompt refund.

GUARANTEE #2

Even after 15 days — here's how you are still strongly protected — if you decide to keep the manual — and you apply for an SBA Loan anytime within 1 year ... your loan must be approved and you must actually receive the funds or your money will be refunded in full.

Only because we are so confident that this is a fact do we dare make such a strong binding seldom-heard-of Double Guarantee. **No stronger guarantee possible!**

Of course, no one can guarantee that every request will be approved—but clearly we are firmly convinced that any sound business request properly prepared—showing a reasonable chance of repayment and submitted to SBA—will be approved.

THOUSANDS ARE PROPERLY APPLYING AND BEING APPROVED. HERE'S YOUR CHANCE TO JOIN THEM!

FREE BONUS

If you order your manual today you'll receive a valuable treasury of fast, easy, low-capital and highly profitable business programs worth forty-five dollars — yours absolutely free!

100% tax deductible as a business expense. Don't delay — order your copy today!

NO RISK LOAN OPPORTUNITY FORM

Detach and rush for COMPLETE PREPARATION ASSISTANCE FOR LOAN APPROVAL

Please rush me ________ copies of "Business Opportunity Seekers' Loans Manual" each at a $20 fee plus $3.00 handling and shipping.

I am fully protected by the two strong guarantees above. I'm ordering today – so I can receive FREE – the valuable treasury of fast, easy, low-capital and highly profitable business programs ... worth forty-five dollars – mine free to keep even if I decide to return the manual for a full refund.

☐ Enclosed is Full Payment
☐ Cash ☐ Check ☐ Money Order
Send payment with order.

Name ____________________
Please Print Clearly
Address ____________________
City ____________________
State ________ Zip ________

MAIL TO:
Financial Freedom Publishers
110 W. 5th St. Dept. AM-1
Winston-Salem, NC 27101

ORDER NOW

GUARANTEED YOUR LOAN MUST BE APPROVED . . . OR MONEY BACK — ONLY A SMALL PRICE TO PAY FOR THE LOAN YOU CAN GET . . . NO RISK AND NO HASSLES.

 Reader Service No. 257

The real meat here, however, is the do-it-yourself wargame kit.

Declining the prompt to choose one of the four historical scenarios leads right into a series of questions that establish the guidelines for the setup the gamer wants to create.

User-defined parameters for customized scenarios include battle area (open sea, Sava Sound, or custom map), time and date of battle, game length, visibility level, air control over battle area, damage control levels, type of action (Japanese or Allied transport, bombardment, or battleline), large or small battle, and fleet composition. There are 53 different American and 27 Japanese ships from which to pick. It is also possible to have the computer make the selection. Fortunately, the program makes such choices with a keen eye toward historical accuracy.

Picking ships manually gives the gamer the ability to set up many "what-if?" situations. A sure winner for lovers of naval slugfests is to take the biggest and baddest battleships from each side, put them in the middle of the open sea, ring the bell, and let them fight it out. Even those who are ordinarily bored by the leisurely pace of sea battles should get a charge out of this type of melee.

High praise for the construction module shouldn't mislead prospective buyers. There's a lot more here than a battle generator, and *Warship* scenarios are definitely as much fun to play as they are to construct.

The game starts with the deployment phase. Both players will adjust the starting location, speed, and direction of each ship. If the computer is controlling one side, it takes care of this job.

The computer can handle both fleets while the gamer merely sits and watches. In fact, this is a good way to learn about the game.

The computer can command either side against a human foe. It is possible to handicap either side with a 10-20% strength reduction, which makes it easy to have an even matchup between two human commanders of unequal experience.

Once the battle starts, the armchair admirals can enter commands for each ship. These include hold fire, torpedo fire, gun fire, open fire (both guns and torpedoes), change of speed or course, and change formation.

The program rates the main guns, secondary mounts, tertiary mounts, speed flotation, radar, armor, year of availability, and torpedo tubes for every available vessel. It is possible to alter any of these figures before the battle.

Victory conditions are preset for the historical scenarios. For those designed by the computerist, the game awards points for different actions. The player with the most points at the end of the game is the victor.

One of the most enjoyable aspects of the game is its handling of damage to ships. There is no simple damage total that, when surpassed, causes the boat to sink. There can be damage from fire and flood to electrical systems, bridge, rudder, and weapons. Damage impairs the performance of the ship, but won't necessarily cause it to sink from view.

The onscreen map is a 60 × 60 square grid which represents the playing area selected. The location of each ship appears on the grid. When the player moves the cursor to that ship, information about that vessel is displayed at the top of the screen.

Despite all the options and variables, *Warship* is an easy game to penetrate. Even a novice will fall into the rhythm by the end of the first round of play.

At no time did a ship do something diametrically opposed to its orders. The individual captains do their best to follow each instruction to the letter. Seafaring World War II gamers won't want to be without *Warship.*

Strategic Simulations Inc., 1046 N. Rengstorff Ave., Mountain View, CA 94043 (phone: 415-964-1200).

—Rick Teverbaugh

Reviewed Next Month:

- **Video Vegas**
- **Titanic: The Recovery Mission**
- **Howard the Duck: Adventure on Volcano Island**

Only NRI teaches you to service all computers as you build your own fully IBM-compatible microcomputer

NEW! Train with the newest Sanyo 880 Series Computer—it's fully IBM-compatible and runs almost twice as fast!

With computers firmly established in offices—and more and more new applications being developed for every facet of business—the demand for trained computer service technicians surges forward. The Department of Labor estimates that computer service jobs will actually *double* in the next ten years—a faster growth rate than for any other occupation.

Total systems training

No computer stands alone... it's part of a total system. And if you want to learn to service and repair computers, you have to understand computer *systems.* Only NRI includes a powerful computer system as part of your training, centered around the new, fully IBM-compatible Sanyo 880 Series computer.

As part of your training, you'll build this highly rated, 16-bit, IBM-compatible computer system. You'll assemble Sanyo's "intelligent" keyboard, install the power supply and disk drive and interface the high-resolution monitor. The 880 Computer has two operating speeds: standard IBM speed of 4.77 MHz and a remarkable turbo speed of 8 MHz. It's confidence-building, real-world experience that includes training in programming, circuit design and peripheral maintenance.

No experience necessary—NRI builds it in

Even if you've never had any previous training in electronics, you can succeed with NRI training. You'll start with the basics, then rapidly build on them to master such concepts as digital logic, microprocessor design, and computer memory. You'll build and test advanced electronic circuits using the exclusive NRI Discovery Lab®, professional digital multimeter, and logic probe. Like your computer, they're all yours to keep as part of your training. You even get some of the most popular software, including WordStar, CalcStar, GW Basic and MS DOS.



Your NRI total systems training includes all of this: NRI Discovery Lab® to design and modify circuits • Four-function digital multimeter with walk-you-through instruction on audio tape • Digital logic probe for visual examination of computer circuits • Sanyo 880 Series Computer with "intelligent" keyboard and 360K double-density, double-sided disk drive • High resolution monochrome monitor • 8K ROM, 256K RAM • Bundled software including GW BASIC, MS DOS, WordStar, CalcStar • Reference manuals, schematics, and bite-sized lessons.



NRI is the only technical school that trains you on a total computer system. You'll install and check keyboard, power supply, disk drive, and monitor, following step-by-step directions.

Send for 100-page free catalog

Send the coupon today for NRI's 100-page, full-color catalog, with all the facts about at-home computer training. Read detailed descriptions of each lesson, each experiment you perform. See each piece of hands-on equipment you'll work with and keep. And check out NRI training in other high-tech fields such as Robotics, Data Communications, TV/Audio/ Video Servicing, and more.

SEND COUPON TODAY FOR FREE NRI CATALOG!

NRI SCHOOLS

McGraw-Hill Continuing Education Center
3939 Wisconsin Avenue, NW, Washington, DC 20016
We'll give you tomorrow.

For Career courses approved under GI Bill
☐ check for details.

☑ CHECK ONE FREE CATALOG ONLY

- ☐ **Computer Electronics**
- ☐ TV/Audio/Video Servicing
- ☐ Satellite Electronics
- ☐ Robotics & Industrial Control
- ☐ Data Communications
- ☐ Industrial Electronics
- ☐ Communication Electronics
- ☐ Electronic Design Technology
- ☐ Telephone Servicing
- ☐ Digital Electronics Servicing
- ☐ Basic Electronics
- ☐ Electricians
- ☐ Appliance Servicing
- ☐ Small Engine Repair
- ☐ Air Conditioning, Heating, & Refrigeration
- ☐ Locksmithing & Electronic Security
- ☐ Building Construction
- ☐ Automotive Servicing
- ☐ Photography
- ☐ Bookkeeping & Accounting

Name (Please print) ______ Age ______

Street ______

City/State/Zip ______

Accredited by the National Home Study Council

202-037

AMIGA SECTION

Reviewed This Month:

DIGI-VIEW

New Tek

Price: $200

Time after time we have expounded on the value of the visual in terms of the textual. An Amiga equipped with the Digi-View video digitizer system raises the price of the digitized image to even greater heights. We are of course setting our values in terms of computer memory rather than a form of legal tender. In simplest terms, the greater the detail in the digitized image the greater are its memory storage needs. As we shall see, Digi-View is capable of highly detailed digitized images.

The Digi-View system consists of three components: a diminutive hardware module, a tri-color filter wheel, and some rather sophisticated driving software. This report will look at the currently available Version 1.0 of the system software. We will also preview some of the new features of Version 2.0. The latter should have begun shipping by the time you read this review.

The Digi-View hardware module is in an epoxy sealed 2 × 3" plastic package which is barely an inch thick. The last dimension includes the 25 pin connector, which mates to the Amiga's parallel port, and the opposing RCA jack through which it accepts the video signal. As the package is solidly sealed from the outside world, we have foregone our traditional gory exposé of its innards.

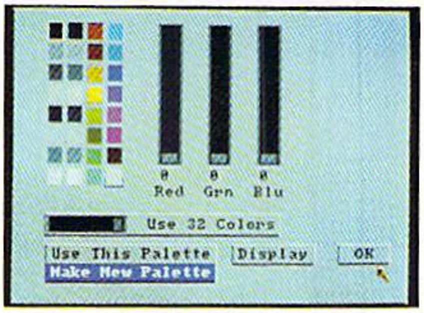
In fact, New Tek has several reasons for the impenetrable packaging. One of these, we suspect, is to limit the possibility of casual duplication. In a more practical vein, the rigid assembly aids in keeping the module in place after the hookup is complete. We have also been told that the high input impedance of the precision comparator upon which the circuit is based makes the board extremely sensitive to changes in humidity. Thus, sealing the module in epoxy successfully addresses several concerns.

We have already pointed out that the Digi-View module plugs into the Amiga's parallel port. This will most likely displace many a printer. As the port may be difficult to access, serious consideration should be given to including an A-B switch in the cost of the package. This will most likely involve some custom cabling, as the Amiga's 25 pin, male, D-subminiature connectors are not usually associated with computer printer ports. Note that page 121 of the 1987 Radio Shack catalog lists all the parts for constructing custom cables.

Digi-View is somewhat fussy on the quality of its video signal. It will be happiest with a source of RS-170 monochrome video with 2:1 interlace and a ⅔ inch vidicon. The last requirement insures sufficient resolution for the Amiga's 400-line interlaced display. This pretty much rules out most video sources which may be found lying around the house. In fact Digi-View will digitize practically any kind of video signal. However, if the above requirements are not met, some degradation of the image will occur. This could range from a slight loss of resolution to pronounced color fringing or other interference patterns.

In fact, according to New Tek, the preferred video source is the Panasonic WV-1410 black and white security camera. We didn't just take New Tek's word on this. Inasmuch as we already had an Ikegami ITC-40 laying about from our C-64 video digitizer projects, we decided to go ahead with it. We even went so far as to instail the optional 2:1 interlace chip in the Ikegami camera: a procedure which cost about $25, required waiting six weeks to get the part, and took about one hour of our time.

The results were perfectly satisfactory, although the digitized images seemed to lack some of the snap of the New Tek samples. We finally broke down and got the WV-1410. This resulted in a small but notable improvement in the digitized images.





Top: Digi-View's color palette control panel. Bottom: a sample image.
READER SERVICE NO. 288

The greatest benefit was with the hires monochrome digitization. The WV-1410 has one other notable advantage which may not be available on other cameras: an easy to use, screwdriver-driven mechanical focus on the back of the camera. This adjustment lets the camera get extremely close to small objects–close enough to image parts of a 35 mm slide.

Digi-View will generate full color digitized images, but it abhors color video signals. Instead it expects a color separation of the original image. This is accomplished by successive digitizations through a three color (red, green, and blue) filter wheel. Although we show a square "wheel" in our sample photographs, New Tek has finally gotten around to cutting

the corners. All current Digi-Views will ship with circular color wheels.

The current version of Digi-View requires the manual positioning of the color wheel. As of this writing, New Tek is getting ready to offer an automated version for an additional $50. This will be comprised of a small stepper motor connected to the second joystick port, and appropriate driving routines added to the software.



Compare this multicolor capture to the black and white Commodore-digitized images on page 64. Digi-View converts a 4096 color RGB image to 32-hue IFF format, ready for user manipulation.



All images on these pages are in the Amiga's lo-res (320 × 200 pixel) mode. These magazine reproductions lack much of the detail of the original images as seen on the Amiga screen.

System Software

Digi-View 1.0 is actually two separate programs. The RGB version uses the Amiga's lo-res screen (320 by 200 pixels) to create digitized images with up to 4096 colors. The hi-res version works in the Amiga's 640 by 400 pixel display to generate black and white images in 16 shades of gray. New Tek has plans for a hi-res color driver for Digi-View, but this will require humongous amounts of memory. They are waiting for the proliferation of multimegabyte memory expanders for the Amiga before embarking on this project.

The lo-res version supports four image formats. The first actually saves the three separate black and white images which correspond to the digitized data obtained through the color filters. Images saved in this RGB format can be recalled with the ability to perform all of Digi-View's color modifications still intact. RGB images are very expensive in terms of memory. A single image is worth nearly 200 kilobytes! How about that for the information content of a picture?

Once the RGB data is in the Amiga's memory it can be manipulated in several ways. The most impressive is to use the 4096 color option to display a HAM (Hold And Modify) image. As the accompanying samples show, these images can be astonishing for the quality of the digitization. Color balance of the image can be adjusted by fiddling with the red and blue portions of the image file. Control of brightness, contrast, and sharpness is also available.

A look at Digi-View's digitization process will give a better picture of how it works. As with the other digitizers we have looked at, Digi-View does a slow scan of the incoming signal. A vertical column of pixels is digitized every 1/30 of a second. Since the signal is in 2:1 interlace, every other half frame is not used for lo-res mode. Thus a single color scan, composed of 320 columns, takes nearly 11 seconds to complete. An RGB image, composed of three scans, requires 33 seconds to complete.

Digi-View actually stores 21 data bits for each pixel, seven for each color. This is nine more bits than the Amiga graphic display can actually use. In effect, Digi-View is working with a pseudo-palette of 2,097,152 colors. The extra data bits are what Digi-View uses to manipulate the color balance, brightness, contrast, and sharpness of the 4096-color RGB images.

A 4096-color HAM image may also be saved in IFF file format. Although there are no paint packages for this format at this time (New Tek is currently showing a very preliminary version of *Digipaint*, a HAM paint package), these images may still be viewed with the various "slide show" programs available for the Amiga. Once saved as an IFF HAM file the image cannot be manipulated by Digi-View as it does not retain the original RGB data.

Perhaps the most fascinating aspect of lo-res Digi-View is the option which converts the 4096 color RGB image to a 32 color IFF format. This format can be manipulated by Amiga paint programs such as *Deluxe Paint* or Aegis' *Images*. The surprising part is how well a "natural" image can be represented with only 32 colors.

As a final option, the red portion of the image may be saved as a 32-level gray scale IFF image. Of course prior to using this option the red digitization should be done using the clear part of the filter wheel.

The original manual fails to document an interesting, but esoteric, Digi-View option. If so instructed, Digi-View will display a histogram of the digitized image. A pair of unmarked vertical line graphs will appear. One of these graphs represents the raw digitized data, the other displays the adjusted data. Separate sets of graphs are maintained for each of the three color files. The horizontal axis represents the 128 possible gray levels of the red, green, or blue portion of the image. Remember that seven data bits are internally maintained for every pixel of each color file. The vertical axis of the graph represents the proportion of pixels which have the associated brightness value. Note that a lo-res image is assembled from 64,000 pixels. Digi-View assumes that every image has a pure white and a pure black component. The histograms are always adjusted to achieve this state.

As we mentioned above, the hi-res mode only supports a 16-level gray scale image in IFF format. Nevertheless it is still possible to manipulate the brightness, contrast, and sharpness of the digitized image. The amount of detail in the hi-res digitized images, using the Panasonic camera, was surprising. We were able to obtain readable copies of digitized text.

Digi-View 2.0

We were able to obtain an alpha release of Digi-View 2.0. Even so, numerous additional features were already implemented. A 4096+ mode improves significantly on the quality of the HAM images. The result is increased detail, along with the elimination of the color fringing which occasionally occurred using the 4096 mode.

Two more lo-res digitizing routines have been added. A five second mode trades off speed for lower resolution. A twenty second mode offers higher resolution with noisy video signals. These may occur under low lighting levels. Three samples are taken of each pixel. The results are averaged to cancel out much of the noise. The twenty second mode may also be used with home color video cameras. The results will still not have the resolution which is possible with a black and white camera, and the color filter wheel will still be required to get a color image.

A color palette control panel has also been added. Images may be created using between 2 and 32 colors. Individual control of each color is also possible. Three sizes of digitized images are also available. These occupy the full screen, 1/4 of the screen, and 1/16 of the screen.

Conclusion

We consider Digi-View to be a truly fun product. It never ceases to fascinate us, nor does it ever fail to amaze our friends. Applications for Digi-View range from the frivolous to the sublime. We know of one person who digitizes X-ray photographs for presentation and analysis. We have also found that a color screen dump of a HAM image is an excellent way to dress up the children's book reports.

The basic Digi-View package is not overly expensive considering all that it does. The 2.0 release is shaping up into an even more impressive product. However, a fully functional setup can add up the dollars. The camera alone more than doubles the system cost. A copy stand and lights are almost essential. We have been using a sturdy tripod equipped with a horizontal arm to position our camera. If you are already into photography you may already have invested in many of these accessories.

New Tek, 701 Jackson Suite B#, Topeka, KS 66603 (phone: 913-354-9332). *–Morton Kevelson*

The Digi-View Connection

The Digi-View manual specifically warns against using a "Y" adapter to split the video image for viewing on the monitor screen. Nevertheless, some means of monitoring what the camera sees is essential for proper framing and focus. We have also noticed that the camera must be connected to Digi-View when it is first booted up. Lack of a video signal during bootup results in a gross distortion in the width of the digitized image. A convenient camera switching setup can be assembled from readily available parts. Simply run the camera cable to a two way coaxial switch (Radio Shack 15-1254, $4.95, is ideal). Two short lengths of audio patch cords connect the output of the switch to the monitor's composite video input jack and Digi-View. The coaxial switch transfers the camera signal between Digi-View and the monitor. The Amiga 1080 monitor has a front panel switch to select between RGB and composite video. The coaxial switches are usually fitted with "F" type screw-on connectors. These can be adapted to the RCA push on connectors with female RCA to male "F" type jacks (Radio Shack 278-255, $1.19).

Alternate Lenses

Good quality "C" mount video lenses can be expensive. The lens from a 35 mm single lens reflex camera may be usable with a video camera. "C" mount adapters are available for many popular 35 mm camera mounts. Note that the "standard" lens for the security cameras has a 16 mm focal length. Thus most 35 mm camera lenses will act as telephoto lenses when mounted on a video camera.

Lighting

Adequate lighting is important for good digitization. Although the black and white security cameras are extremely sensitive for low light operation, low light levels can result in "noisy" images. Video noise appears as a graininess to the displayed image. The low light problem is aggravated by the Digi-View color filter wheel. The blue in particular substantially cuts down on the light. We found that a pair of 100 watt bulbs, in five inch photo flood reflectors, generated adequate quantities of light.

PAGESETTER
Gold Disk, Inc.
Disk; $149.95

PageSetter is the first desktop publishing software for the Amiga. As such, it stands on the shoulders of a well-established and growing variety of similar software for the Macintosh; it has thus avoided most of the early pitfalls and oversights of first generation software. Gold Disk has created a package that is easy to learn and use, yet maintains a great deal of depth. What failings *PageSetter* has seem to be related to the rush to market, and are definitely correctable.

Opening *PageSetter* (via *WorkBench* or CLI) leads you to a blank desktop. À la Deluxe Paint, a series of gadgets along the right side work in conjunction with the drop down menus to handle your layout chores. Both are very intuitively arranged, and I found them extremely comfortable to use.

PageSetter's primary vocabulary consists of "pages" and "boxes." You first create a page by selecting the option from the menus—the resulting requester window contains all the pertinent information for the basic page format. Page size is selectable from standard (8½ × 11") or legal (8½ × 14"); the European style sizes, A4 and B5, are also supported. You can also enter your own width and height measurements in the appropriate boxes for your own individual size. Maximum page size is 8½ × 11" and the minimum is 2 × 1".

Column layout is also accompanied in this requester. Simply fill in the number of columns and their widths in the respective spaces. You can select as many columns as you can fit on a page; *PageSetter* checks for illegal combinations of measurements. This feature works on all elements of the Page Format requester. For example, you can have three columns 2½" wide, but only if you shrink the left and right margins to ¼" each. Otherwise, *PageSetter* will warn you that your "Columns are Too Large" and redo your settings to the previous one.

You can now see your empty page by clicking on one or more of the three Art Board layout gadgets along the right side of the screen. The first displays or hides the grid—you can change the size of the grid (1/2", 1/4", 1/8", or 1/6") by selecting a different measurement under the Art Board menu. The Ruler along the outside of the page and the Margins (including the columns) can also be toggled into and out of view by selecting their gadgets. One difficulty I had was in remembering when these gadgets were "on." When they are de-selected, they are darkened—this makes them look like they are highlighted. An important consideration to remember is that the margins and columns are guides and not boundaries, and can be overwritten at any time.

Once your page is set, you are ready to create your first box. This is done by selecting the box icon on the side of the screen. Then, just as in any graphics program, you click the mouse where you want to start the box and drag it open to the appropriate size. Boxes in *PageSetter* contain all the elements that go to make up the page and are fully adjustable in size, position, and attributes.

For a quick demonstration of the flexibility of boxes, let's set up a headline using the QuickText gadget. Clicking on this icon brings up a string requester which allows you to enter up to 100 characters. Type in your headline and press RETURN. Your box now has the text printed inside. Notice how quickly the text was rendered. This is one of *PageSetter's* hallmarks: speed. Compared to *Pagemaker* for the Mac, *PageSetter* is blazingly fast.

Now let's see what options are available to you. Selecting Current Box from the menu strip brings up a requester similar to the Page Format one. Here there are options for making your box solid or transparent (allowing you to overlap text and graphics), and with or without a drop shadow. This is where you decide how the text in your box is to be justified, as well as the top and left margins. Choosing a border will give you a minimum figure for these margins. You can select from six different styles of borders (including none), with three methods for displaying those borders (all four sides, left and right only, or top and bottom only). You can also select a background for your box—a white-to-black gadget in the center allows this option.

The Current Box window also allows you to select the leading (pronounced "led-ing") and the tracking of the text. Leading refers to the space between the lines of your text—this is how you can get the double space look. Tracking has to do with microjustification, an important concept in desktop publishing. The aim of microjustification is to avoid relatively large amounts of white space between characters or words while flush-justifying text. In *PageSetter,* this feature is user-definable. You can determine the maximum amount of tracking, in points, for both characters and words. This is a very sophisticated feature for an entry-level program.

Finally, the Current Box requester is where you select the fonts for the text within the box. Clicking on the font name—Topaz 9 is the standard ROM font—brings up a directory requester showing you all the available fonts. I much prefer this method to that of *NotePad* and its drop down menus, as it allows far more fonts to be accessed. All the Amiga fonts are supported, as are any that adhere to the standard, including the commercially available Zuma fonts and several public domain varieties. These can be made available by assigning the fonts to another directory. For example, my assign statement is now in my startup sequence—"Assign fonts: Allfonts:fonts". The best part of this is that *PageSetter,* besides having the usual underline, bold, and italic algorithms, has included a few of their own: shadow, outline, and reverse. And they all work with other fonts! This is almost worth the price of the software alone.

But man does not live by headlines alone. The key to desktop publishing is easy formatting of bodies of text. Text can be split over many pages and a desktop publishing package needs

Why Are We Giving Away Your Choice of Today's Popular Top Hit Tapes and Records ...

each for only a 30¢ SUPER DISCOUNT COUPON

Plus Shipping & Handling

everytime you buy another hit of your choice at regular retail price?

THIS PRICE IS NOT A MISPRINT! which currently are $7.98 to $9.98—plus shipping and handling. (Multiple-unit sets and Double Selections may be somewhat higher.)

Until midnight May 29, 1987 – we will give you these booklets of thirty 30 cents coupons for only

$9 Per Booklet Of Thirty 30¢ Coupons

Good for any 30 top hits of your choice $269.40 value!

- **Super Discount Coupons Are Guaranteed Redeemable One-By-One Or As Many As You Like At A Time.**
- **No Need To Use Up Your Coupons All At Once, If You Don't Want To – Coupons Are Redeemable Until May 12, 1988.**
- **A Printed Chart Accompanies Each Coupons Booklet Listing Hundreds Of The Nation's Hits In All Categories Of Music.**

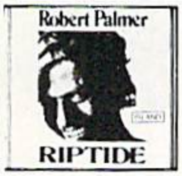


























Here Are Just Some Of The Many Thousands Of Hits You Can Get With Each Of Your 30 Cents Super Discount Coupons!

Choose From • All Artists • All Labels • All Kinds Of Hit Music

★ Rock ★ Pop ★ Country ★ Black Music ★ Heavy Metal ★ Rap ★ Easy Listening ★ Jazz ★ Classical ★ Christian/Gospel

You'll Find Many More Listed In The Top Hits Chart That Comes With Each Coupons Booklet.

Don't Miss Out — Order Now!

As part of a nationwide publicity campaign, an innovatively bold, pioneering North Carolina firm will give away one million (1,000,000) Guaranteed Super Discount Coupons Booklets for the Shocking Publicity Price of only $9 a booklet to every person who reads this publicity campaign ad and writes to the company address (below) before midnight, May 29, 1987.

You absolutely must send this Original Publicity ad along with your request. No copies or Photostats accepted.

Please note that – even though the company's astonishing price of $9 per coupons booklet will expire on the above mentioned May 29, 1987 date – however, you will be allowed a much longer time period to redeem your super Discount Music Coupons. A $269.40 value.

The company guarantees that it will promptly, redeem all coupons sent in for redemption – all the way up until May 12, 1988. That's plenty of time for you to use up all your coupons. Also you are permitted to transfer your coupons to someone else to redeem, if you wish. These Super Discount Coupons make excellent gifts too.

Each Super Discount Coupons Booklet contains 30 coupons, which can be redeemed for any of the current national bestseller tapes, and records. All are original artists, on the original labels. No counterfeits, no bootlegs, and no sound-alikes! You'll receive the same Popular recordings played on radio stations everyday. Included, along with your order – you'll get an up-to-date chart, listing hundreds of the very latest hits to choose from.

These are the same popular, nationally advertised Top Hits Super Discount Coupons Booklets you may have already heard about.

These Super Discount Coupons offer the easiest low cost way to build a fantastic music collection fast! Many music buyers everywhere have used these coupons to save themselves some really good money.

Now, you can own every current hit tape, and record, that you want. You too can enjoy these fabulous savings that Super Discount Coupons bring.

Every Music lover in America would love to get their hands on them – So don't risk missing out by responding too late! These are the fastest selling, and most sought-after Super Discount Coupons ever sold by this most enterprising North Carolina firm.

These popular, Nationally Advertised Super Discount Music Coupons will not be sold at this price by the company in any store. There is a limit of just Two (2) booklets per address at this price, but if your request is sent early enough (before May 24) you are allowed to request up to 5. Each booklet is strongly backed by the company's full one-year money-back guarantee.

To order your Guaranteed Super Discount Coupons mail this entire original publicity ad (no copies or photostats accepted) along with your name and address and $9 for each Coupons booklet. Add only $1 shipping per booklet ordered (North Carolina residents add sales tax.) Allow up to 3 to 5 weeks for shipment. Make check payable to Top Hits Clearinghouse.

Mail to Top Hits Coupons Booklets, Dept. AM-1, 110 West 5th Street, Winston-Salem, North Carolina 27101.

COUNTRY HITS
1 **Randy Travis,** Storms of Life
2 **Steve Earle,** Guitar Town
3 **Hank Williams, Jr.,** Montana Cafe
4 **Dwight Yoakam,** Guitars, Cadillacs, Etc., Etc.
5 **George Strait,** #7

BLACK HITS
1 **Cameo,** Word Up
2 **Anita Baker,** Rapture
3 **Run-D.M.C.,** Raising Hell
4 **Oran "Juice" Jones,** Juice
5 **Lionel Richie,** Dancing On The Ceiling

JAZZ HITS
1 **Andreas Vollenweider,** Down To The Moon
2 **Spyro Gyra,** Breakout
3 **Pieces Of A Dream,** Joyride
4 **Bob James/David Sanborn,** Double Vision
5 **Yellow Jackets,** Shades

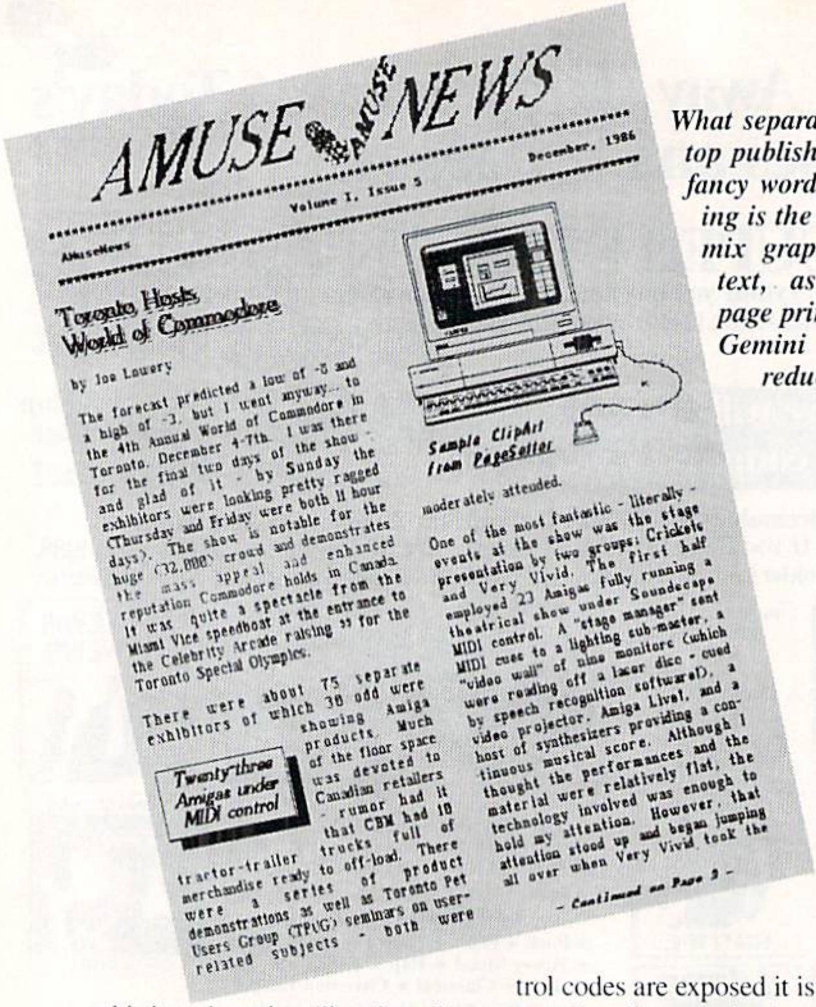
CLASSICAL HITS
1 **Vladimir Horowitz,** Horowitz: The Studio Recordings
2 **Vladimir Horowitz,** Horowitz: The Last Romantic
3 **Kathleen Battle,** Kathleen Battle Sings Mozart
4 **Branford Marsalis,** Romances For Saxophone
5 **Luciano Pavarotti,** Anniversary

CHRISTIAN/GOSPEL HITS
1 **Rev. M. Brunson/Thompson Community Choir,** There Is Hope
2 **The Williams Brothers,** Hand And Hand
3 **Douglas Miller,** Unspeakable Joy
4 **Shirley Caesar,** Celebration
5 **Sandra Crouch,** We're Waiting

Don't Forget — This Amazing Low Price Offer Expires May 29, 1987 To Readers Of This Publication.

Just try finding any record club or store anywhere – that will give you all the current hits for the astonishingly low price of only 30¢ each! Just a mere $9 for a booklet that's redeemable for 30 hits ... a $269.40 value!

Reader Service No. 258


AMUSE AMUSE NEWS

December, 1986

Volume I, Issue 5

AMuseNews

Toronto Hosts World of Commodore

by Joe Lowery

The forecast predicted a low of -5 and a high of -3, but I went anyway... to the 4th Annual World of Commodore in Toronto, December 4-7th. I was there for the final two days of the show - and glad of it - by Sunday the exhibitors were looking pretty ragged (Thursday and Friday were both 11 hour days). The show is notable for the huge (32,000) crowd and demonstrates the mass appeal and enhanced reputation Commodore holds in Canada. It was quite a spectacle from the Miami Vice speedboat at the entrance to the Celebrity Arcade raising $$ for the Toronto Special Olympics.

There were about 75 separate exhibitors of which 30 odd were showing Amiga products. Much of the floor space was devoted to Canadian retailers - rumor had it that CBM had 10 tractor-trailer trucks full of merchandise ready to off-load. There were a series of product demonstrations as well as Toronto Pet Users Group (TPUG) seminars on user-related subjects - both were

Twenty-three Amigas under MIDI control

Sample ClipArt from PageSetter

moderately attended.

One of the most fantastic - literally - events at the show was the stage presentation by two groups: Crickets and Very Vivid. The first half employed 23 Amigas fully running a theatrical show under Soundscape MIDI control. A "stage manager" sent MIDI cues to a lighting sub-master, a "video wall" of nine monitors (which were reading off a laser disc - cued by speech recognition software), a video projector, Amiga Live!, and a host of synthesizers providing a continuous musical score. Although I thought the performances and the material were relatively flat, the technology involved was enough to hold my attention. However, that attention stood up and began jumping all over when Very Vivid took the

- Continued on Page 3 -

What separates desktop publishing from fancy word processing is the ability to mix graphics and text, as in this page printed on a Gemini 10X and reduced 50%.

sophisticated text handling that allows you to quickly format columns of text while still being able to go in and edit that file. *PageSetter* handles this with its built-in Text Editor. This menu option brings you to another screen with its own text commands. Files can be loaded that are either in Generic (ASCII), Scribble!, or TextCraft format. *PageSetter* automatically converts the latter two file types to its own format with control codes exposed. *PageSetter* uses the " \ " as an escape character to toggle commands such as bold, italic, underline, outline, shadow, and reverse. There is also a " /n " for "normal" which turns off all other display codes. Two nice additions are a soft hyphen, allowing *PageSetter* to break a long word if necessary, and a paragraph command for easy entry of multiple lines during QuickText.

The *PageSetter* text editor refreshes on a line-by-line basis; a touch slow for my taste. However, it does contain all expected features: a full cut-and-paste block menu, search-and-replace options (because the control codes are exposed it is very easy to make all words that have been underlined into bold, italic ones), and easy movement within the file—both menu and key commands are supported here.

Once you have edited the file, quit the editor and select the "Write" icon from the gadgets; your cursor will become a pencil. Now clicking the mouse in a box will spill the text from the editor into that box. If the text overflows, a small "Size Me" gadget appears in the lower right corner. Clicking and dragging here allows you to resize the box. Or you can use the "link box" feature. Linking two or more boxes will cause the text to flow from one to another, filling as much space as possible. This is the key to *PageSetter's* ease of use. Boxes can also be unlinked to isolate particular passages of text; however, this effect carries over into the text editor, separating your text file.

What separates desktop publishing software from fancy word processing software is the ability to mix graphics and text. *PageSetter* has a graphic editor to handle these chores. Here the image you load in or draw (clipart) is monochrome. *PageSetter* will load any IFF file and convert the colors to its series of shadings. I loaded the King Tut pictures from *Deluxe Paint* with superb results. Clipart should be designed in medium resolution (640 × 200) with desktop publishing in mind. Although there is a sizing tool, *PageSetter* doesn't always give you an ideal reproduction; it is best to scale the drawing to its approximate size elsewhere and import it. A variety of graphic tools are available here: smooth and dot draw, line, fill, rectangle, ellipse, and two levels of magnification. Once your image is complete, use the Frame tool to surround it and clip it either in 1:1 or 5:4 ratios—the latter gives a better representation of the actual printer output. Now, like the text editor, quitting the graphic editor returns you to the main screen. Selecting the "Paint" icon will turn your cursor into a paintbrush and allow you to click in an empty box. Presto! Your image has been transferred from graphics buffer to page. You can fine-tune the placement by clicking on the Graphic Adjust gadget arrows to move the image within the box.

Well, we've been cooking for a long time—how does it taste? Printouts in this release of *PageSetter* are available to any of the graphic printers in the Amiga preferences. All one has to do is select "Black and White" under the Graphic Printer preferences. I printed a document on several different printers to test this vital area. The first time through I selected "Press—Current Page" under "Department" menu. This resulted in a document with a ⅛" horizontal white line about every two inches. A call to Gold Disk verified the problem and a solution. *PageSetter* attempts to hold the entire page as one raster image in memory—as the program itself is very large, this is frequently not possible. In this case, *PageSetter* will break the page into smaller slices and send that entire rastport to the printer at a time; upon sending the next rastport, most printers will reinitialize and many will execute a

linefeed at that time. Gold Disk has supplied a print utility, PagePrint, to overcome this problem. As this is a much smaller program, the entire page can be held in memory at once and the previous problem is not encountered.

Dot matrix output is surprisingly clean. I found that by adjusting the size (12 point works well) and the leading (a value of 1 or 2 is best), my document is extremely readable. As *PageSetter* uses a graphic dump, the printout can take a long time. Neither PostScript nor DDL, the laser printer languages, are implemented in this version of *PageSetter;* however, a module for both should be available by the time you read this. I also attempted to print a page using a Hewlett-Packard LaserJet Plus. However, as the LaserJet can only handle one half page of graphics at a time–again a memory problem, only this time on the LaserJet–I was only able to get a half page printed.

Memory considerations are a major stumbling block with *PageSetter.* Because of a bug in Intuition that does not return memory once a font has been opened and then closed, large blocks of RAM go quickly. Gold Disk recognized the problem and has four steps to aid this dilemma. First there is QuickMove, which turns off the use of the blitter for moving text so that you only see the box outline–perfectly acceptable for most text or graphic repositioning. Then there is a toggle for the Memory Warning. This advises you to save your document as memory is getting low. It is wise to keep this on. Third, there is Memory Cleanup, which attempts to piece together fragmented blocks of memory into one continuous block. It also serves to refresh the screen if necessary. Finally, there is an "Emergency.Save" file that will hold your document should a memory crash occur. It is reassuring to see a company address these problems right off the bat.

Future releases of *PageSetter* will include an interlace option that allows you to view ¼ of the page at a time under full magnification instead of the ⅛ currently available. This will also allow for Landscape printing. PostScript will be built in, as will support for the HP LaserJet. Color is being considered; however, this may lead to more memory problems.

In conclusion, I would rate *PageSetter* very highly for its speed, ease of use, and superb user interface. Shortcomings are the kludgey solution to the printer problem, and the lack of more keyboard shortcuts. However, Gold Disk's commitment to the product is such that I feel these failings will soon be a memory. An excellent first program in what is bound to be a hotly contested field on the Amiga.

Gold Disk, Inc., P.O. Box 789, Streetsville, ONT, Canada LSM 2C2 (phone: 416-828-0911). *–Joe Lowery*

IMPACT!
Aegis Development
Disk; $199.95

Impact! is not a program for the average computer user. Instead, it seems aimed at a very specific portion of the buying public: those who need to design graphics presentations that can be displayed on a computer screen for easy viewing. Salespeople and corporate managers frequently use slides to illustrate their presentations. Some of the slides can cost up to $50 apiece by the time they are finished, so simulating slide show presentations with a computer can be much cheaper.

In addition to the dollars saved, a great deal of production time can be eliminated by using computer slide shows. Creating slides with special graphics and text overlays can take as much as two weeks. The time delay can result in lost sales or uninformed decisions. A program like *Impact!* solves these problems.

With the Amiga's outstanding colors, resolution, and ease of use, *Impact!* can be used to design screen displays with complicated graphics and text overlays in a fraction of the time it would take to create customized slides. But *Impact!* doesn't stop there. It includes a slide show program that will take these screens and present them in a prescribed order. The slide show module also lets you do fades, spiral ins and outs, and screen wipes, in addition to jumping between slides.

Creating screens can be great fun. With over 4000 colors to choose from, you could waste days just looking at the color selections. I really enjoyed using the color palette section. Using a sliding gauge, you modify the amount of red, green, and blue in each color until it's just the way you want it. The corresponding colors in the fill patterns are modified at the same time.

Screens can be drawn freehand or you may use commands to create geometric shapes in whatever size or color you need. You have a choice of nine brush styles. There is no facility for designing your own brushes.

There are bi-colored fill patterns available for use in "coloring" your shapes, but these only work with shapes created using the program's shape commands. If you try to fill a box or other shape that just happened naturally, it doesn't work.

Graphs can be created using numeric data entered one number at a time in the graph creation module, or by reading in figures from an output file created with a spreadsheet package or word processor. This file must meet certain parameters, but it is a commonly used format.

You can overlay text on top of your graphics to identify parts or explain figures. Text can be presented in many different point sizes and fonts. Text can be in bold, italic, shadow, underline, or outline.

The slide show program that is included as a separate module is used to design the presentations and Aegis encourages its distribution, while retaining its copyright to the module. The *Impact!* program on the other hand is licensed for the owner's personal use only and must not be on disks that are given out. If you wish to send your creation out on disk, all you need do is put the appropriate screen files and the slide show program on a disk.

The only limitation I found in using this package was the lockups that occur when you run out of memory. With only 512K of memory, it took me very little time to get too complicated for my Amiga. The documentation does warn of this and encourages use of more memory and/or RAM disks to speed things up and eliminate memory overflow.

The program does have printer support and screen illustrations can be written to disk in IFF format, so you can use your illustrations with programs like *Aegis Draw Plus, Aegis Animator, Deluxe Paint,* and *Deluxe Video.* Unfortunately, screens that are created with other programs cannot be used by the slide show program.

The manual is a softbound book that bears a suggested price of $24.95 on the cover. Interesting concept, but I wouldn't pay more than $12.95 for it. Adequately illustrated, it has a tutorial section in the front that gets you right into using the program. I found the index lacking.

I was pleased to find that the program wasn't copy protected. With a package like this, I wouldn't want to work from my only copy. When the occasional lockup occurs it can be fatal to the disk in use. I strongly agree with the manual that you should always work from a backup copy.

Impact! is a fun program to draw with and the presentation graphics are excellent. For those with a need for a product like this, I'd recommend it. I do think that at $199.95 it's overpriced, but with the slide show module being freely distributable it isn't that unreasonable.

Aegis Development, 2210 Willshire #277, Santa Monica, CA 90403 (phone: 213-392-9972).

—Cheryl Peterson

TURBOPOKE

For the C-64

By Jim Frost

BASIC games and utilities often include pages of data statements for machine language routines, sprites, and graphic effects. READ and POKE commands are then used to convert the data to usable machine language. But BASIC handles data so slowly that the pause for POKEing data usually allows time for a cool drink, a trip to the rest room, or...you get the point. *Turbopoke* is a short machine language utility that moves data to memory at a blazing 11000 bytes per second so your program can start immediately.

To use *Turbopoke*, type and save the listing on page 113. Next, add *Turbopoke* to your program using a merge utility. If you don't have one, list the data onscreen, delete line 395, then load your program, typing the load commands directly under line 390. Press return for each data line, then reenter line 395. Your program may need to be renumbered to avoid line number conflicts. Next modify the READ/POKE routine in your program to load the 170 bytes of *Turbopoke* to the cassette buffer at address 828. Since *Turbopoke* is short, this takes only a few seconds. Now add the following line to your program:

```
SYS828,ADDRESS,LINE
```

ADDRESS is the place where the remaining data belongs and LINE is the line number where the original data begins. *Turbopoke* fills memory with data from the specified line number and continues until the last data statement or until a data value of 256 is read. To move blocks of data to different locations, add an extra DATA 256 to the end of each data block and use separate SYS828, ADDRESS,LINE for each. *Turbopoke* works reliably for correctly typed data statements including substitution of commas for zeros; however, part of its speed is achieved by eliminating SYNTAX testing. Test your data statements using BASIC READ and POKE, since errors in data will cause unpredictable results.

In writing *Turbopoke* I tried to maximize speed as much as possible while keeping length reasonable. Subroutines were used only in initialization where they are executed once. In the main program loop, key sections of code are repeated to eliminate time-consuming subroutine calls. Whenever possible, branching decisions are planned so that the branch occurs on the least likely event. This saves the extra machine cycle required when a branch is taken. The number converting routine uses lookup tables rather than ROM routines or slower, more general calculations, and is limited to numbers of 0 to 255. The special case of 256 exits to BASIC. □

SEE PROGRAM LISTING ON PAGE 113

STOW AWAY

For the C-64

By Buck Childress

Wouldn't it be great if you could load or save a program in mere microseconds, without using a disk drive or cassette recorder? I'm talking about the times when you wish you could instantly save a program in order to check out a different version or routine. The last thing you want to do is come up with another strange sounding name to save it under, let alone wait for the disk or tape drive to merrily do its thing. Oh, the pain! Now you have to wait again while it loads back into the C-64. Then you have to scratch that strange name you saved it under. Whew! There's got to be a better way. But instant storage without a recording device? Can it be? You betcha!

Stow Away stows (saves) and salvages (loads) BASIC programs in the blink of an eye. It's great for those times that you want to look at another program or routine, without the hassle of a disk or tape operation. Maybe you want to try another version of the program you're working on, but want the current version left intact. Or perhaps you just want a copy stashed away in case of an accidental NEW. *Stow Away* does the trick.

Stow Away doesn't actually load and save in the conventional sense. It transfers your BASIC program to an invisible area of RAM entirely separate from the BASIC and FREE RAM areas. This area of RAM lies under the BASIC interpreter and operating system ROMs. It isn't available for most applications since it must be switched in and out, with various preparations beforehand. However, it's perfect for our use. Besides, why let all this good RAM go to waste? With it you have 16,384 bytes of storage area for your program—storage area that won't interfere with whatever else you may have in memory. 16,384 bytes will hold a mighty big program. I have one that's 475 lines long and uses 16,235 bytes.

Stow Away is easy to use. Here's how. After saving a copy of *Stow Away*, run it. The BASIC loader POKEs the machine language data into memory and checks for errors. When it's finished, type SYS 52000 and press RETURN. A message verifies *Stow Away* is on. Once *Stow Away* has been activated, don't run the loader again. Doing so will upset important pointers.

When you want to use *Stow Away*, press any letter key followed by RETURN. I thought this would be handier than having to SYS 52000 every time you want to use it. (The cursor must be at the beginning of a blank screen line when you do this.) Four options will appear on your screen. Just press the corresponding number key to use them. Here's what they are.

The first option quickly stows your program in that hidden RAM area. If you currently have something there, you'll be given a chance to cancel. *Stow Away* verifies that the program you want to stow is within the 16,384 byte range before proceeding. If it isn't, *Stow Away* lets you know you've got a monster on your hands. Then it cancels the option and returns to BASIC.

The second option quickly salvages your stowed goodie and places it back in BASIC RAM. If you already have something in BASIC memory, *Stow Away* gives you a chance to cancel.

Whether you're stowing or salvaging, the ease and speed are terrific. The process takes less than a second for most programs. My 475-line, 16,235-byte monolith takes about two seconds. When it's done, *Stow Away* displays the byte count of your program.

Should you inadvertently find yourself staring at the menu, all the while wondering what you're doing there, the third option will let you make your great escape back to BASIC. If, like me, you frequently do things and later wonder why, this little tidbit will come in handy.

Last but not least, option four deactivates *Stow Away*. A message verifies it's off. SYS 52000 reactivates *Stow Away*.

Here are a few things to remember when using *Stow Away*. You can load and save all the BASIC programs you want without affecting *Stow Away* or anything you may have stowed. You can run programs, too. Just be sure they don't POKE data into *Stow Away's* domain (52000-52920). If the program you want to run has custom characters, or in any other way switches the ROM/RAM memory (most don't), you'll have to save a copy of your stowed program to disk or tape first. You should deactivate *Stow Away* before you run a program. Since *Stow Away* actually saves your work to another area of C-64 memory, not disk or tape, be sure to save a copy of your work before you switch the computer off.

Give *Stow Away* a try. It's a fast, unique way to instantly save and load your work. □

SEE PROGRAM LISTING ON PAGE 106

ERRATA

Vault of Terror (October '86)

An error in line 159 may prevent the player from winning. To eliminate this problem replace the current line 159 with the following:

```
159 DL(CC,2)=BO(8)
```

Rebels and Lords (December '86)

Under certain circumstances, the program will not be able to tell when no armies are left. Fix the bug by replacing line 590 with:

```
590 NEXT:UD=M:QD=0:IFA<WTHEN630
```

Hanger 14 (January '87)

Lines 9 and 99 were missing characters. Replace them with:

```
9 GOSUB104:TI$="000000

99 P$="[4" "][DOWN][4"[LEFT]"][4" "][DOW
N][4"[LEFT]"][4" "][UP][UP]
```

VIDEO DIGITIZERS
For the C-64
Text and Photos by Morton Kevelson

It seems that everything is going digital these days. Compact discs have revolutionized home audio reproduction, digital televisions are starting to appear, and digital audio tape recording is ready and waiting in the wings. All of these processes have one thing in common. Their original data is fundamentally analog.

Precisely speaking, an analog process is one which is characterized by a continuously varying signal. The value obtained by measuring the signal is dependent on the precision and response time of the measuring instrument. It is thus possible to glean additional information from an analog signal by improving your measuring instruments.

By comparison, a digital process is characterized by the presentation of data in discrete packets at uniformly timed intervals. Once data is placed in digital form, the limits of precision are fixed. The quality of data in an eight bit format is not improved by feeding it into a sixteen bit machine.

Although analog phenomena are characterized by theoretically infinite resolution (our apologies to the quantum physicists in our audience), it is possible to digitize these processes with acceptable accuracy. In this way a finite series of samples, with a limited range of values, can be made to adequately represent the original data.

The required degree of accuracy is of course determined by the intended application. For example, audio digitization for compact discs is accomplished by sampling the sounds approximately 44,000 times per second with twelve data bits allocated to each sample. When properly decoded, the resulting sound is nearly indistinguishable from the original.

The advantages of digitizing analog data are numerous. Endless copies of digital data can be made without any loss of resolution. The data itself may be manipulated by computer processing emphasizing the desired response while eliminating noise and distortion. Anyone who has compared the best vinyl recordings to the compact disc will attest to the effectiveness of this process.

Visual images may also be captured as digital data for computerized







Top left: Computereyes high contrast capture in Koala *multicolor format. Top right: A 280 × 192 pixel image by Computereyes II and Spartan. Right: 8 level, 160 × 200 pixel Kinney image.*

Reader Service No. 252

VALUE-SOFT

9513 S.W. Barbur Blvd. M-56
Portland, Oregon 97219

Dealers & Schools Welcome



For ORDERS only

1-800-544-SOFT

Oregon call 1-503-246-0924
Add $2.00 S. & H. Visa/MC gladly

'LBow™

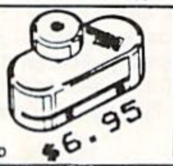
CARTRIDGE PORT CONVERTER
CUSTOMIZED DESIGNED FOR
COMMODORE 64 & 128 COMPUTERS

- BUILT-IN "WARM RESET" BUTTON WILL ELIMINATE TURNING POWER OFF/ON TO RESET
- PARALLEL EXPANSION PORT ON L'BOW'S BACKSIDE ALLOWS SIMULTANEOUS HARDWARE & SOFTWARE ACCESS.
- VERTICAL CARTRIDGE PORT MAKES CARTRIDGE USE MUCH EASIER
- NO MORE STRESS ON THE COMPUTER'S PRINTED CIRCUIT BOARD FROM THE PRESSURE OF PLUGGING IN CARTRIDGES SINCE 'LBOW PUTS IT ALL ON THE TABLE TOP.



DISK DOUBLER

CUTS A PRECISION SQUARE NOTCH IN THE DISKETTE AT EXACTLY THE RIGHT SPOT SO THE "FLIPSIDE" CAN BE USED



C-64 POWER SUPPLY

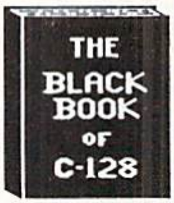
$29.95

CABLES ETC.

6	Ft.6 pin, male both ends	# B66	$6.95
9	Ft.6 pin, male both ends	# B69	$8.95
18	Ft.6 pin, male both ends	# C618	$16.95
6	Ft.6 pin, male/female	# A66	$6.95
9	Ft.6 pin, male R-ang/male	# R69	$9.95
6	Ft.Monitor, 5 pin/4 RCA	# D56	$9.95
6	Ft.Monitor exten., 5 pin	# E56	$6.95
6	Ft.Centronics, male/male	# C6MM	$14.95
6	Ft.Cent., male/female	# C6MF	$14.95
6	Ft.RS-232, male/male	# G625	$14.95
100	write protect tabs	# TAB	$1.49
100	Tyvek disk sleeves	# DS	$5.95
6	jewelers screw drive set	# SC6	$4.95

PROTECTION REVEALED NOW $15.95

A begginers guide to software protection. Become a master of illusion. Book is 141 pages, free disk of 21 utilities included



REFERENCE BOOK $15.95

The best friend a C128 owner ever had. Includes C64, 128, CPM 3.0, 1541, & 1571 drives 261 pages, 75 easy charts & tables. Think of Black Book as a dictionary, always ready to answer your questions.

BEGINNER'S PAK 64 $15.95

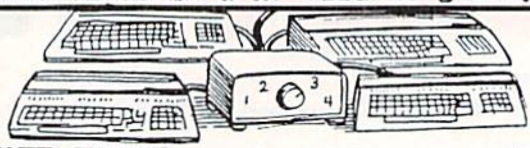
1.150 popular subroutines on disk, add to your own programs, graphics, sorts, etc.
2.poster (21x28) screen/color memory map.
3.extensive C64 memory map
4.18 bound cheat cards, commands at hand
All four items in one great package price

CARTRIDGE PORT CABLE $19.95

10 in. extension cable for cartridge port

APROSPAND-64 $29.95

4 slot switchable expansion board, plus a reset button/fuse protection. Plugs into cartridge port, has 4 switchable (singly or any combination) expansion connectors. Gives your C64 or 128 full expandability. This is superbly designed unit.



$ SAVER SWITCH $29.95

Vic-20, C16, Plus 4, C64, C128, AB switch 2 computers to 1 drive and printer or two printers to 1 computer. 3 female sockets, plugs in in seconds.

SUPER SAVER 4 $79.95

4 Commodore computers to 1 drive/printer, great for schools or business.

MONITOR SWITCH $39.95

Share 1 monitor with 2 computers, change output at the turn of a knob. The box has 2, 5 pin cables, 1 to each computer, plus a 8 pin socket for the monitor. C64/C128

CENTRONICS AB SWITCH $39.95

All 36 pins switched, female connectors, gold pins, high quality push button.

CENTRONICS ABCD SWITCH $59.95

All features of the AB except 4 computers to one device. Rotary switch.

RS 232 AB SWITCH $39.95

All 25 pins switched, female connectors, gold pins, high quality push button.

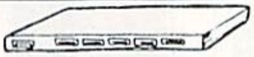
128 CABLE 40/80 column $9.95

80 columns with the 1701/1702 monitors.

128 40/80 switchable cable $21.95

80 columns, plus built-in switch

POWER CENTER $59.95



EMI filtering, 15 AMP breaker, surge protection, lighted rocker switches, heavy all metal case. $5.00 shipping this item only

ULTRAVOX Sound System $39.95

Add an exciting new dimension to sound on the C64/C128. Creates 100% stereo, with a built-in amp to power speakers directly. Also works with VCR & TV

E.M.C.S. Music Construction Set $29.95

The powerful music processor for the C64, Plays 32nd notes, allows long compositions A 2 disk set, also 40 pre-recorded songs.

BRAND X 64 Disk Cataloger $19.95

4,000 files or 100 disks. Add, save, etc. Identifies 14 file types, print lists in 1, 2 or 3 columns, prints disk labels.

VIDEO LOG 64 $19.95

Catalog the movies you have saved on your VCR. 1,000 films or 250 tapes. Print list of titles/tape #, labels for tapes. Data saved: title, start/end, length, category

Reader Service No. 248

processing. We first looked at this process on the C-64 a bit over one year ago. At that time we reported at some length on the Computereyes video digitizer for the C-64. The quality of that product, its relative simplicity in terms of both hardware and software, and its reasonable cost, combined with the growing size of the Commodore market, led us to believe that we would have been able to present several such products well before this time. Thus when we finally accumulated three digitizers from what it turned out were not independent sources, we forged ahead with this presentation.

We have previously indicated the worth of a C-64 image at up to 10,001 bytes. If we consider the byte as equivalent to a computer word, this is substantially more than the 1,000 words normally charged for a picture. As we have pointed out, a word is worth a millipicture. The price of a C-64 image has not changed a bit. However, if you peruse the review of Digiview for the Amiga elsewhere in this issue, you will find out the true cost (in terms of data and not dollars) of quality graphics. We must issue a strong word of warning before you turn to the Amiga Section. Side by side comparisons of Amiga graphics against 64 has been known to cause grown men to weep, women to sigh, and children to crow with delight. The net effect is invariably stressful on your pocketbook.

A Brief Dissertation on the C-64 Bit Map Display

An appreciation of the way the C-64 displays bit-mapped images will be useful for getting the most out of your video digitizer. The C-64 has two bit map display modes. Both modes utilize an 8,000 byte data block as the basis of the display.

The hi-res mode generates a graphic screen which is 320 pixels wide by 200 pixels high. A quick calculation reveals a one-for-one correspondence between each bit of the bit map and every pixel. Associated with the hi-res bit map is an additional 1000 bytes of color data. Inasmuch as the C-64 only displays 16 colors, it is possible to store two color values in each color byte. The value of the lower half of the color byte corresponds to pixels whose bit value is zero. The upper color nybble is linked to pixels with a bit value of one. There is a 64 to 1 correspondence between the 8000 byte bit map and the 1000 byte color map. Every 8 by 8 area of the bit map screen is assigned to a single byte of the color map.

The multicolor mode produces a graphic screen consisting of 160 pixels across by 200 pixels high. This is half the horizontal resolution of the hi-res mode. Note that the screen display is the same size, as each pixel is now twice as wide. The advantage of multicolor mode is increased color flexibility. Since two bits now correspond to a single pixel, we can generate four values and display as many as four colors within each eight byte, 64 bit, 32 pixel display cell. One of these colors is defined by the contents of a single nybble which sets the background color of the entire display screen. Two more of the colors are stored in a 1000 byte block which corresponds to the color data of the hi-res screen. The remaining color is taken from the values in an additional 1000 nybbles of color data. Thus each four by eight pixel block of the multicolor screen may display up to three independent colors and a fourth background color which is common to the entire screen.

To summarize, a hi-res image consists of 8000 bit map bytes and 1000 color bytes for a total of 9000 data bytes. Each eight byte, 64 pixel graphic block of the hi-res screen has an associated color byte which defines its two possible colors. A multicolor image contains all of the above plus an additional 1000 nybbles of color data plus a single nybble to define the screen background color. Since the color memory nybbles each occupy a unique byte address, the total multicolor picture consists of 10,001 bytes. Each eight byte, 32 pixel graphic block of the multicolor screen has associated with it 1½ bytes

READER SERVICE INDEX

Page	Company	Svc. No.
63	Abacus Software Inc.	251
65	Abacus Software Inc.	252
C-4	Access Software Inc.	245
10	Accolade	291
10	Accolade	292
85	American Int'l Computer Products	282
41	The Avalon Hill Game Company	230
20,21	Berkeley Softworks	237
29	Berkeley Softworks	238
31	Berkeley Softworks	239
23	Berkeley Softworks	242
25	Berkeley Softworks	243
27	Berkeley Softworks	244
49	Business Opportunity Publishers	257
57	Business Opportunity Publishers	258
79	Business Opportunity Publishers	259
87	Business Opportunity Publishers	260
51	Central Point Software Inc.	261
7	Cheatsheet Products, Inc.	283
11	COMAL Users Group USA	–
13	COMAL Users Group USA	–
13	Commodore International	295
34	CompuServe	270
35	Computer Mart	240
28	Computer Centers of America	250
84	Computer Swap, Inc.	278
C-2	Digital Solutions Inc.	266
C-3	Dreamrider Software Inc.	236
14	Dune Systems	287
44	Electronic Arts	231
38	Electronic One	269
61	Emerald Component Int'l	263
47	Epyx	233
47	Epyx	234
71	Free Spirit Software, Inc.	268
24	HesWare	241
12	Howard W. Sams & Co.	294
68	Inkwell Systems	254
44	Intellicreations	232
59	Jason-Ranheim	271
36	KFS Software, Inc.	276
11	Lease Program Headquarters	293
4,5	Lyco Computer	255
12	Master Software	272
60	Maxtron	275
52	McGraw Hill	–
89	Metacomco	273
39	Microcomputer Services	267
83	Micro-W. Distributing, Inc.	279
12	Midwest Software	285
53	New Tek	288
82	Ohio Computer Services, Inc.	281
15	Precision Peripherals & Software	253
42,43	Pro-Tech-Tronics	256
16-19	Protecto Enterprizes	277
40	R.J. Brachman Assoc. Inc.	262
8	Simon & Schuster Software	290
50	Skyles Electric Works	249
9	Software Discounters	247
6	S&S Wholesalers, Inc.	246
48	Strategic Simulations	235
8	Suncom	289
14	Superior Micro Systems, Inc.	286
13	Supra Corporation	296
80	T.C. Electronics	274
83	TecTrans	280
46	Unlimited Software Inc.	265
66	Value-Soft	248
61	Wedgwood Rental	264
10	Xetec, Inc.	284
30	*Ahoy!* Back Issues	–
38	*Ahoy!* Disk	–

The publisher cannot assume responsibility for errors in the above listing.

of color data which define three independent colors for each cell.

Video Sources

You can't digitize an image without an image to digitize. None of the C-64 digitizers are particularly fussy about the source of the images, as long as they are fed a standard NTSC video signal. In a pinch, the video output of a home VCR can be used if nothing else is available. A stationary video frame is essential, as the digitizers all require several seconds to capture an image. Some time will also be required to adjust the digitizer's brightness control. A video camera is the best source, as it also lets you choose the subject matter. The color camera of your home video system will do just fine.

Connection to the digitizers is via a standard RCA type phono jack. Some cameras have a special cable for their VCR. A simple solution is to patch the camera through the VCR using its built-in video output. For the bargain-conscious Commodore user, a possible low-cost alternative to a color camera or VCR is a black and white camera. These cameras can often be found selling as no-frills security devices ranging in price from $150 to $300.

COMPUTEREYES
Digital Vision Inc.
Commodore 64/128
Price: $129.95

We reported on Computereyes, in considerable detail, in the September 1985 issue of *Ahoy!* Our opinion of this product remains unchanged. Since that time, the manufacturer has added some additional support software to link Computereyes to recent C-64 graphics packages.

Computereyes consists of a hardware module and supporting software on disk. The Computereyes black box plugs right into the C-64/C-128

user port. It does not interfere with the cassette port (on the C-64) or the RGB port (on the C-128), as it is the same width as the user port connector. Two adjustments are provided. The first syncrhonizes Computereyes to your video source. This setting is easily done with the help of the supporting software.

The second adjustment compensates for the brightness of the image or the intensity of the signal. The setting of this control has a direct bearing on the appearance of the image. The adjustment is also rather sensitive, with small movements resulting in a large change in the appearance of the digitized image. The software provides for a special adjustment mode which continuously scans the image without blanking the display. This lets you make a coarse setting of the brightness control. The fine adjustment will still have to be done during the actual digitization.

System Software

All of the Computereyes operations are listed on the single menu screen. A concise manual details all of the functions. Most of the manual can be dispensed with, as all of the essential operating instructions are included in a set of disk-based help files.

The basic system software lets you capture an image in several formats. A single scan digitization creates a high contrast black and white image in about six seconds. The digitization process captures a single column of pixels on every video scan. Since the NTSC, non-interlaced frame rate is 60 times per second, it takes over five seconds to capture the 320 pixel columns of the C-64 hi-res mode.

In addition, a 4-level and 8-level capture can be performed. These require a corresponding number of additional scans. Digitization time for the 8-level capture is over 50 seconds. All of the images are pure 8000 byte

bit maps. Separate color data, which defaults to black and white, is not saved to the disk. Instead the gray levels are produced by varying the dot patterns. This type of bit map is well-suited for printing on a black ribbon dot matrix printer.

Although you can use the digitized images in your own programs, the basic Computereyes format does not correspond to any of the commercial graphics packages which are available for the C-64. For these, Digital Vision offers optional compatibility software in support of several popular formats.

DOODLE! from City Software was one of the first drawing programs available for the C-64. It utilizes the C-64's hi-res format to produce 320 by 200 pixel colored images. The Computereyes compatibility software for the *DOODLE!* package adds low-contrast and high-contrast modes to the three captures available with the basic software. These extra modes make use of all five of the C-64's gray levels (black, white, and three shades of gray). The gray scale data is saved in the hi-res color map which is part of the *DOODLE!* file format. The resulting images have more detail and finer gradation than the standard captures. The low-contrast capture uses four scans at adjacent brightness levels of the video image. The high-contrast capture is similar, except that a brightness level is skipped between each scan. This increases the contrast, or brightness range, of the captured image.

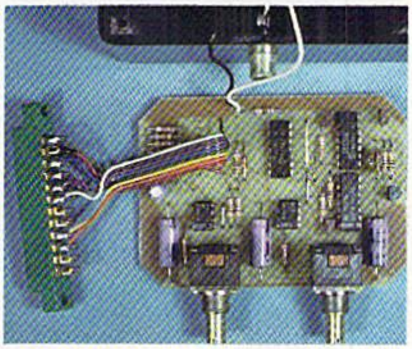
The *Flexidraw* package is a light pen driven hi-res drawing package from Inkwell Systems. The compatibility software for *Flexidraw* is very similar to the *DOODLE!* support package. The differences lie in the disk file format and the size of the bit map. The *Flexidraw* file format saves the color data in a separate 1000 byte file. Thus *Flexidraw* image files with color actually consist of two disk files. *Flexidraw* also uses the 48 rightmost pixels of the bit map screen as a menu area. Thus *Flexidraw* images are only 272 pixels wide. Computereyes still digitizes the entire bit map while marking the menu area with a purple stripe.

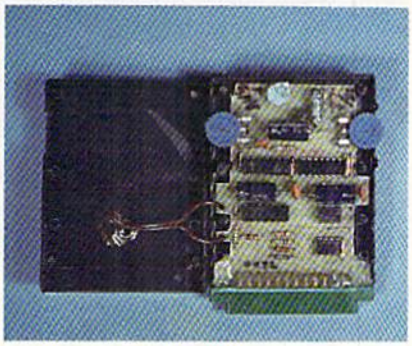
The *Koala* package uses the C-64 multicolor format to generate 160 by 200 pixel color graphics. In this format the Computereyes basic gray scale scans will give peculiar results. Instead, the *Koala* compatibility software provides two gray scale captures in multicolor format. These are similar to the low-contrast and high-contrast captures mentioned above. The image files are saved in the *Koala* format for use with that package. Interestingly enough, the *Koala* format graphics provided the most natural looking digitized images. This was a result of the additional color detail available with the multicolor format. For this application, the additional color outweighed the higher resolution of the hi-res format.

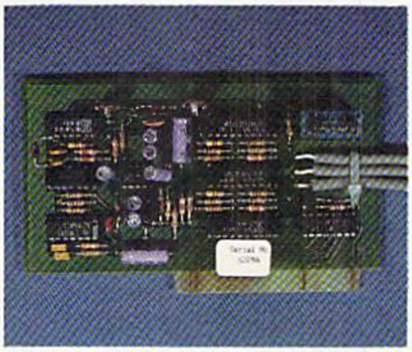
There are two image formats used by *Print Shop*. The most popular is a clip art format which uses a fraction of the entire C-64 bit-map. The second *Print Shop* image format is simply the entire 8000 byte hi-res bit map which is used by the Screen Magic section. The Screen Magic bit maps are identical to the Computereyes images as created by the basic System Software.

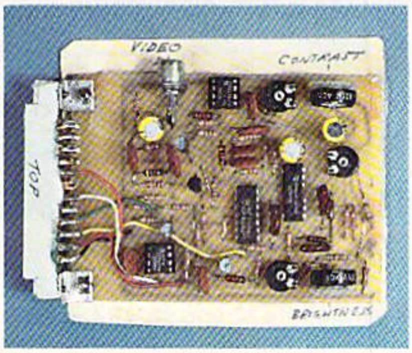
The clip art images exist in two sizes, one for use with non-Commodore printers and the other for use with the 1525/MPS-801/MPS-803 line of Commodore printers. *Print Shop* users may be familiar with the terms "Side A" or "Side B" of the *Print Shop* disk. The first class of clip art are 88 by 52 pixel images. The second class are only 44 by 45 pixel images. The *Print Shop* compatibility software lets you save a portion of the digitized bit map in either clip art format. Since the clip arts are a small portion of the entire bit map (only 7.15% and 3.1% respectively), Computereyes blocks out a larger section of the screen. A 2 by 3 pixel block of the hi-res bit map is translated into a single pixel of the larger size clip art. A 4 by 3 pixel block translates into a single pixel of the smaller clip art.

In other words approximately 43% (for the larger art) and 37% (for the

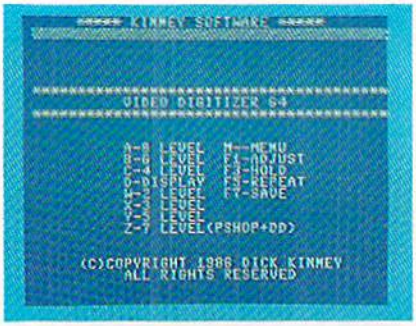


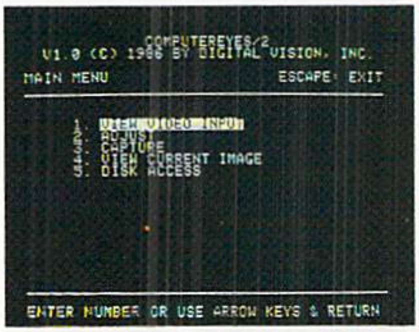


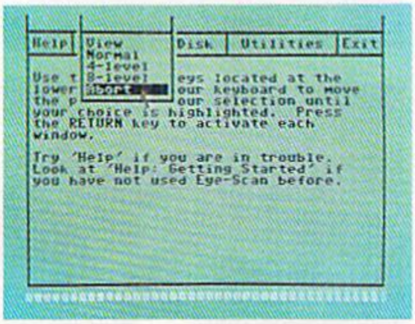




At top: inside Computereyes. Note robust pair of potentiometers, compared to low-cost dials sported by Eyescan, next down. Third down is Computereyes II laid bare. Bottom: the Kinney semi-kit. They provide the software, printed circuit board, and assembly instructions; you provide the parts, time, and labor.









Top: Kinney Software main control menu. Second down: Computereyes II main control screen. Items 2, 3, and 5 bring up additional screens. Third down: Eyescan control screen. All commands are accessed via pull-down menus. Bottom: Computereyes menu for DOODLE! *All commands are displayed, and accessible by one keystroke.*

smaller art) of the 8000 byte bit map are used to generate the clip art images. Within these constraints, the Computereyes *Print Shop* compatibility software lets you pick any part of screen as the clip art. A three level capture is also provided for use with the Screen Magic portion of *Print Shop*. This is in addition to the basic captures mentioned above. Since the Computereyes software can load as well as save files, it may be used to convert any C-64 8000 byte bit map to *Print Shop* format. For example, *Flexidraw* files are already in the proper format. *DOODLE!* files may be easily converted by stripping off the one kilobyte of color data at the start of the file.

The *Newsroom* compatibility software lets you save any 231 by 168 pixel block of the 8000 byte bit map as a *Newsroom* photo. These photos may then be manipulated with the *Newsroom's* photo lab. As with the *Print Shop*, Computereyes will let you manipulate any 8000 byte C-64 bit map.

Digital Vision Inc., 14 Oak Street–Suite 2, Needham, MA 02192 (phone: 617-444-9040).

EYE-SCAN

Digital Engineering and Design
$89.95

We received our sample of the Eye-Scan video digitizer at the West Coast Commodore Association's extravaganza last fall. Initially it appeared to be a worthwhile addition to the growing list of C-64 third party peripherals. As we began using this package we encountered a strong feeling of déjà vu. This was cleared up when we looked at what was beneath the surface. It turned out that Eye-Scan was a superficially disguised clone of Digital Vision's Computereyes.

Well, we hated being cast in the role of whistle blower, but blow the whistle we did. After a quick confirmation, the folks at Digital Vision took the expected action, and, to our knowledge, Eye-Scan is no longer available. Frankly, we are sorely disappointed by this entire incident, although it was not unexpected. The Commodore market is large enough to attract all sorts of promoters.

Nevertheless, we expect that a fair number of our readers have bought the Eye-Scan package. In addition, an undetermined number of these units may still be sitting on dealers' shelves. We feel that a brief overview of the Eye-Scan package would be useful.

The overall package is about one fourth the volume of the Computereyes. This size reduction was achieved by simply replacing the full sized brightness and sync potentiometers with smaller sized, less costly trimmer resistors. As a result the critical brightness adjustment is even more difficult to make. Long term durability of the potentiometers has also been compromised.

We had considerable difficulty disassembling the Eye-Scan package. The cartridge case had been thoughtfully sealed with copious quantities of silicone adhesive. However, we persisted and our efforts were rewarded. At this point we discovered that all the chip identification marks had been scrupulously scraped off, making identification impossible. Not quite! A comparison with the Computereyes circuit board revealed that all of the remaining components had identical values. At this point we tried the acid test. We ran up the Eye-Scan module with the Computereyes software and vice versa. The result was perfect performance in both cases.

In terms of software the folks at Digital Engineering and Design did take the trouble to completely rewrite the user interface. In the process they created a flashy series of pull-down menus for operating the system. Although these menus are very pretty, they do not facilitate the system's operation. The straightforward single keystroke menu of the original Computereyes software was faster and easier to use.

At first glance the Eye-Scan package did seem to offer more than the basic Computereyes software. Images could be saved in *DOODLE!*, *Koala*, or *Blazing Paddles* format. The first utilizes the C-64's 320 by 200 pixel hi-res format. The other two use the 160 by 200 pixel multicolor format. However, images were limited to the basic bit pattern gray scaling

without use of the C-64's own colors to generate a five level gray scale. The extra color data saved with the files contained default values which did not enhance the images.

If you did happen to buy the Eye-Scan package, you may have saved some money off the price of the Computereyes package. You may consider sending all or part of this difference to Digital Vision. This would not be a contribution by any means. In exchange you would be buying the Computereyes compatibility software for the package of your choice at their usual price. These programs do a good job of adapting the Eye-Scan/Computereyes hardware to the graphics program for which they were designed.

VIDEO DIGITIZER (V. 1.2)
Kinney Software
Commodore 64/128
Price: $39.95

Dick Kinney has a rather unusual offering for the Commodore 64 user. This is a first, if not the only, semi-kit we have come across. When you buy this package you will get a system disk, a bare printed circuit board, an instruction manual with parts list, and nothing else. You will then have to go out and purchase all the parts with which to complete the package (about $20-$30 more). You will also have to supply your own tools, time, labor, and expertise with a soldering iron and electronic assembly. When you are done, you should have a working video digitizer at about half the price of its only known competitor.

We found the entire concept to be intriguing. In fact it evoked fond memories of our younger days when we constructed all our short wave radios and hi-fi equipment from kits. However, the Kinney kit is a long way from the polished Heathkits we had grown accustomed to. Although it is not a complex project and its construction is straightforward, we can recommend it only to those with some prior experience with electronic construction techniques. We also suggest that you have access to a voltohmeter to complete the checkout of the finished project.

The circuit board is slightly larger than a standard C-64 cartridge. Its final appearance is dependent on the case you select to put it in. We were running ours fully exposed with just a paper backing on the circuit side of the board. As with the other digitizers, connection is to the C-64's user port. As the board is the same width as the user port connector, there is no interference with the cassette port or the RGB port on the C-128. A standard NTSC video signal is fed into an RCA jack mounted on the board. The RCA jack was not on the parts list, so be forewarned.

As with the other packages, the operating system consisted of the digitizing routines written in machine language with the user interface and menu display written in BASIC. The digitizing routines were surprisingly fast, requiring less than four seconds to create an image. This time was independent of the number of gray levels chosen for the final image. The short digitizing times are achieved by grabbing a vertical column of pixels every sixtieth of a second. The gray level of the image is determined at the same time, so only a single scan of all 160 columns is required. The use of a 160 column digitization marks the Kinney digitizer as primarily intended for use with the C-64's multicolor display format.

Any number of gray levels, from two to eight, may be chosen for the digitized images. However, the display format utilizes only four of the 16 available colors. Uniform values are placed in the background nybble, the low and high nybbles of the screen color matrix, and the color map. You do have the option of changing these default values for any of the available colors. The additional gray levels of the captures which use more than four are achieved by varying the dot pattern.

The digitized images may be saved to disk in several formats. These include a pure 8000 byte bit map, *Koala, DOODLE!, Print Shop* Screen Magic, and *Newsroom* Photo file.

The last option defaults to a central area of the screen and takes about two minutes to set up. Due to the 160 column digitizing scan used by this product, the best looking images are in the *Koala* format. Acceptable results can be obtained in the *DOODLE!* format by carefully choosing the number of gray levels.

Kinney Software, 121 N. Hampton Road—Dept. A, Donnelsville, OH 45319 (phone: 513-882-6527).

COMPUTEREYES II

Digital Vision Inc.
Commodore 64 with Spartan
Price: $129.95

Strictly speaking, Computereyes II is not a 64-related product. It is intended for the Apple II series of computers. However, due to the limited selection of C-64 video digitizers, we chose to bend a few rules, twist some arms, and threaten some kneecaps so we could present this as a Spartan peripheral. As we pointed out in the September 1985 issue, the Spartan is a bona fide C-64 add-on. In fact, this opens the door for a whole new world of C-64 (via Spartan) peripherals.

Speaking of the Spartan, those of you who attended the last World of Commodore in Toronto had the opportunity to pick one up for a mere $129 Canadian! Mimic Systems is apparently clearing out their remaining stock. They did mention something about further size reductions of the Spartan through the use of further circuit integration, and the development of a universal model which may be adapted to several computers.

Additionally, the review of the Computereyes II gave us the chance to see how one manufacturer implements the same product on two different machines. We would expect to see some similarities, as both the C-64 and the Spartan are eight-bit, 64K computers running on a 6502 microprocessor. We were not prepared for the major difference in operating convenience that we found.

In terms of ease of use, the Spartan version wins hands down against the C-64. We expect that a large part of the additional convenience is due to the internal construction of the Spartan's slots. Once installed, the circuit board is not readily accessible to the user. As a result all adjustments have to be done via the computer's keyboard. The initial calibration of Computereyes II is performed automatically with the setup parameters saved to the system disk. These are automatically loaded with each subsequent use. Even the brightness and contrast adjustments are performed via the keyboard with a graphical display. This makes for repeatable adjustments which are not available with the manual controls on the C-64 version.

Computereyes II is also equipped with three video cables. One of these intercepts the video connection to the computer's monitor. A second hooks up to the monitor and the third picks up the video signal. The result lets the user easily switch between the display of the computer's output or the video source directly from the keyboard. This arrangement is very convenient when setting up an object for digitization.

In terms of image quality, the C-64's superior graphics win handily. The Spartan's hi-res graphic display consists of 280 by 192 pixels. This is somewhere between the resolution of the C-64's multicolor and hi-res displays. In addition, the restrictions in the way the Spartan handles color limits its use with digitized images. As a result, Computereyes II must rely entirely on dot patterns to establish the gray levels.

With the Spartan you have a choice of two image captures. The first is a single level scan which generates a pure black and white image. The second is a multilevel scan which simulates a gray scale by the use of dot patterns. Either scan is accomplished in a bit over six seconds. Images may be saved to disk in either packed or unpacked format. The former saves disk space; the latter is the standard Spartan bit map for use with other Spartan graphics packages.

If you do decide to order Computereyes II for the Spartan, indicate your need for the DOS 3.3 version. The disk is normally supplied for use with ProDOS which we were unable to use on the Spartan. Digital Vision has agreed to supply *Ahoy!* readers and Spartan users with the DOS 3.3 version.

Digital Vision Inc., 14 Oak Street—Suite 2, Needham, MA 02192 (phone: 617-444-9040).

Conclusions

Unfortunately, C-64 users do not have a wide range of options when it comes to video digitizers. Unless you are prepared to assemble your own hardware there is only a single choice: Computereyes from Digital Vision.

If we disregard the problem of hardware assembly, direct comparisons are possible. Computereyes does provide a better digitized image, in particular with the optional *DOODLE!* or *Koala* Compatibility Software. These supplementary programs fully utilize the Commodore 64's color capabilities for better looking gray scale images.

When it comes to speed, Kinney Software is the clear winner. A complete image may be digitized in less than four seconds, with up to eight gray levels. However, the digitized image is limited to only 160 pixels horizontal resolution. Kinney also does a less than optimum job of utilizing the C-64's color capabilities by limiting color choices to four out of five possible levels.

Overall, we find some room for improvement with both products. Computereyes would greatly benefit from faster digitization routines. We would also like the convenience of automatic calibration and switching between the video source signals. Digital Vision has already demonstrated this capability with Computereyes II and the Spartan. Kinney Software could also add true 320 pixel hi-res capability and better C-64 color routines to their product.

All programs in this issue are available on disk. See page 37.

COMAL COLUMN

An Introduction

By Richard Herring

If it's not clear from the name appearing above these words, we'll be talking in the months to come, you and I, about the programming language COMAL. Sort of.

This is also supposed to be a beginner's column. And it would probably be nice for both of us if this column were valuable to you even though you do not program in COMAL, or program at all for that matter. (Let me note that a version of COMAL exists at, shall we say, the right place in the public domain.)

That's an interesting set of criteria for the contents of a column. Since they are my criteria, not the editor's, you and I will have to grow together.

Obviously, we will talk about COMAL every month, its strengths, its weaknesses, and a few helpful hints. In describing all that STUFF, I hope to get into some good computer discussions.

Everyone who has reviewed COMAL has compared it to BASIC and to Pascal. When we do those comparisons though, we may wander a bit into why BASIC was created and why it became so popular. And why the university community is so infatuated with Pascal.

COMAL is fast. When we discuss its speed, we'll venture into the arcane worlds of interpreters and compilers. COMAL does turtle graphics. But that does not make it LOGO. Rather than stopping with the differences between the languages, we'll get into the reasons for LOGO's existence and which of those are supported by COMAL.

COMAL also does windows. (Which is certainly not to imply that you should ever stoop so low.) In addition to seeing how, we can talk about windows as a user interface and some of the conceptual background.

When we hit COMAL's sound and sprite capabilities, we will have to delve into interrupts. And if it doesn't get edited out (just kidding David), we might even review how COMAL runs on "those other computers." With luck we'll have some fun along the way too.

It would be easy to characterize COMAL as a souped-up version of BASIC. Unfortunately, that would be about as misleading as calling LOGO a specialized version of BASIC because it too has some similar commands.

Since most BASIC commands are included in COMAL, programmers familiar with BASIC will have a strong foundation with which to begin their COMAL programming efforts. The wealth of additional commands offered by COMAL tell only part of the story about why it is a language in its own right and not just an improved BASIC. COMAL's programming environment is, in truth, the more distinguishing theme.

In 1973 two Swedes, Borge Christensen and Benedict Loefstedt, decided there had to be a better way than BASIC. By the time they finished, that better way was COMAL. They saw that BASIC's simplicity derived from the programming environment it created rather than from the language itself.

When a BASIC programmer types 10 PRINT "HELLO" and then runs his program, he is immediately reinforced. Program lines can be inserted, deleted, or edited one at a time, so no separate text editor is required as in Pascal. But COMAL's authors saw that BASIC's environment made it all too easy for budding young programmers to be led into the trap of writing totally unstructured programs "on the fly."

They looked longingly at Pascal, which had just been developed by Dr. Niklaus Wirth of Zurich, Switzerland in 1970, because it has program structure as its very basis. Pascal is block structured; its programs are composed of blocks of code (akin to modernized subroutines) that start with BEGIN and terminate with END. In effect, each of these blocks is an independent program. This allows Pascal programs to flow logically from start to finish of their code without the abrupt jumps and shifts that characterize BASIC.

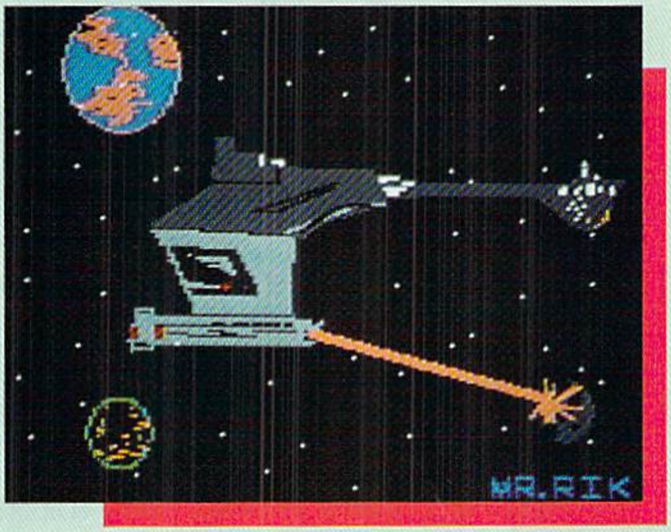
[Ever wonder why some computer languages are capitalized and others aren't? Though not obvious, the answer is simple. Any name that is an acronym is automatically capitalized. Thus we have COMAL for COMmon Algorithmic Language and BASIC for Beginners All-purpose Symbolic Instruction Code. Pascal, however, is named after the seventeenth century mathematician.]

If you are anxious to read more about COMAL before we meet again in the next issue of *Ahoy!*, check out your back issues. (You do keep all those back issues of *Ahoy!*, right?) The disk version of COMAL, which leaves only 10K for your program, is reviewed in the February '85 issue. The far superior cartridge version, which gives you a full 30K to program in, is covered in the *Cadet's Column* in the September '86 issue.

Any of you who have questions, suggestions about this column, or programming hints you'd like to share should write to me: Richard Herring, P.O. Box 1544, Tallahassee, FL 32302. This column—for that matter, this whole magazine—is designed to meet your needs.

To be honest, it's also fun for me when you write. In a couple of previous articles I've encouraged you to write me about specific topics. Whether your letters were from beginners or advanced programmers or from elementary school students or retired businessmen, it has been great to correspond with you. A couple of us have even become friends. Let me know what you think. ☐

ART GALLERY



Art Gallery Disk Sale

The images on these pages are now available on a monthly disk. Multicolor images are supplied in *Koala* format, while high-resolution images are in *DOODLE!* format. Included are a slide show for easy viewing, along with a bit map dump for your 1525 printer or properly interfaced equivalent. Annual (12 month) subscriptions are $89. Individual disks are $12 per month. A sample *Art Gallery* disk with slide show and printer dumps is $10; or send a stamped and self-addressed envelope (business size) for a listing of available *Art Gallery* collection disks. Prices shown are for US and Canada. All others add $3 per disk. New York State residents please add appropriate sales taxes. Disks may be ordered from Morton Kevelson, P.O. Box 260, Homecrest Station, Brooklyn, NY 11229.

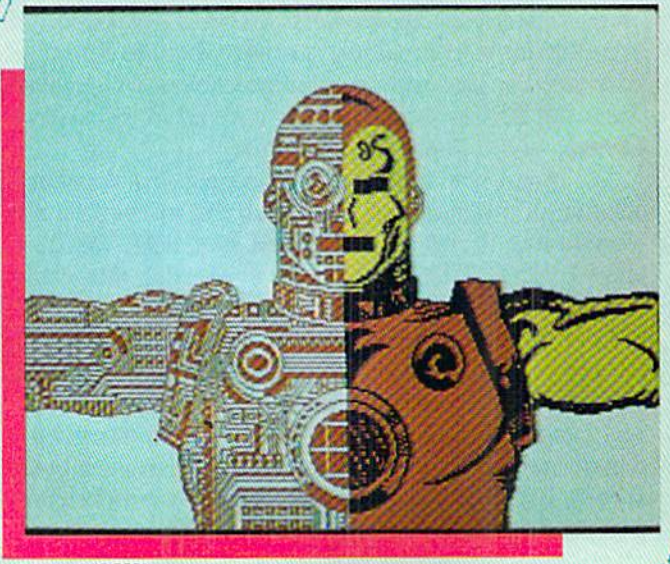
Contribute to Ahoy!'s Art Gallery

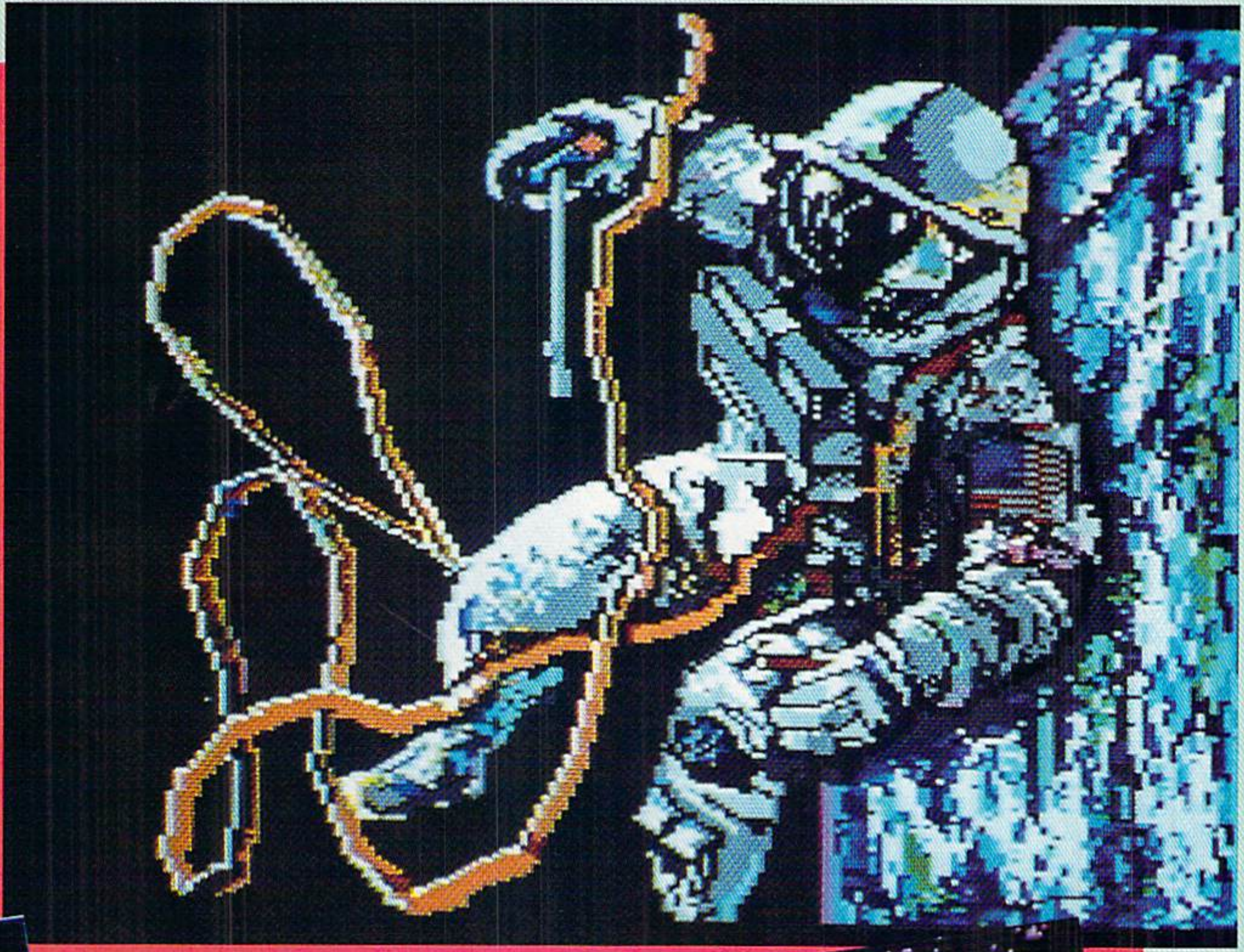
The *Ahoy! Art Gallery* offers the opportunity for fame and fortune to any and all aspiring Commodore artists. Simply send Morton (see address above) your work on disk indicating the drawing package or file format of the images. All graphics produced on the C-64/C-128 and Plus/4 computers are eligible. In exchange your work will receive the opportunity for display in these pages. All published works will receive royalties based on the monthly *Art Gallery* disk sales. In addition, both published and unpublished images may be included on the various *Art Gallery* collection disks.

Note that the *Art Gallery* is not a contest. Published pictures are selected in an arbitrary and capricious fashion by the *Ahoy!* Art Director based solely on the artistic merit of the individual images.

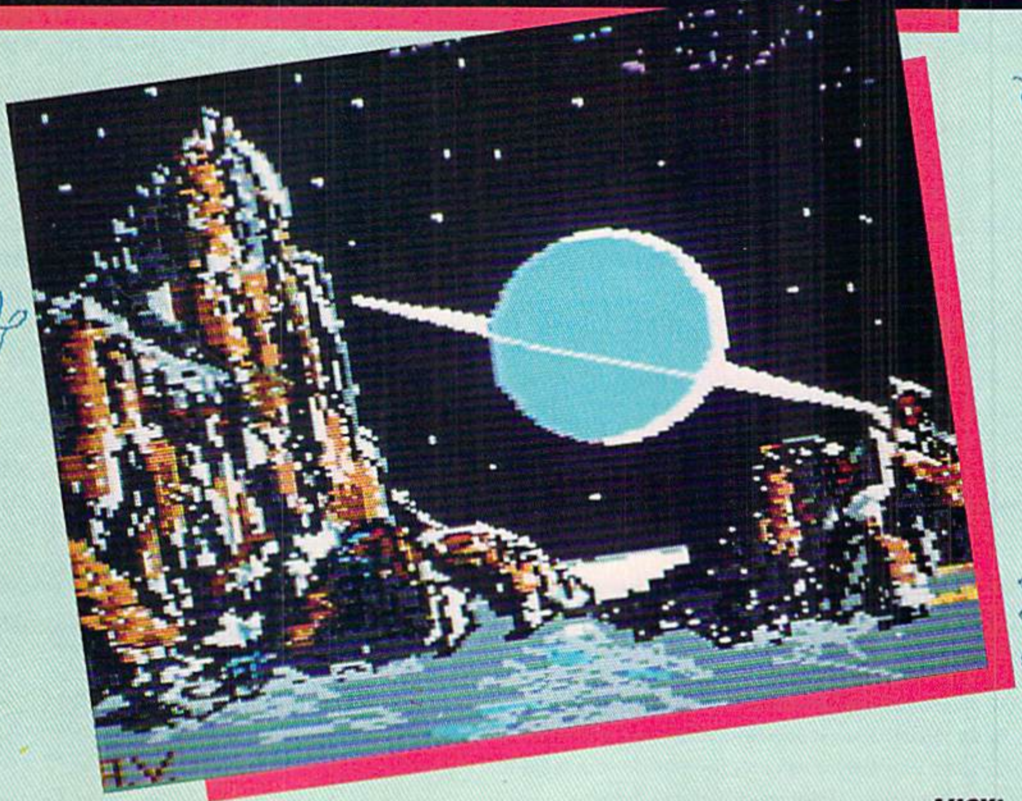
After a two-month cultural lag in the pages of *Ahoy!*, the *Art Gallery* returns this month with a trip to the final frontier, beginning with *Klingon*, above, rendered by Rik Bowen on the Tech-Sketch Micro Illustrator. Continuing clockwise we encounter Alberto Valsecchi's *Spaceman* and *Saturn*. This marks the fourth *Art Gallery* appearance for the Milano, Italy based artist's work, all created with *Koala Painter* on the Koala Pad. Next is *Space Race* by Jason Alan Franzen, age 15, of Omaha, NE. And finally, *Iron Man*, cast by 18-year-old Steven Distasio (Valhalla, NY) on *DOODLE!*








STEP
E...
64



"MAXI-DISK"

...THE NEW ADVENTURE

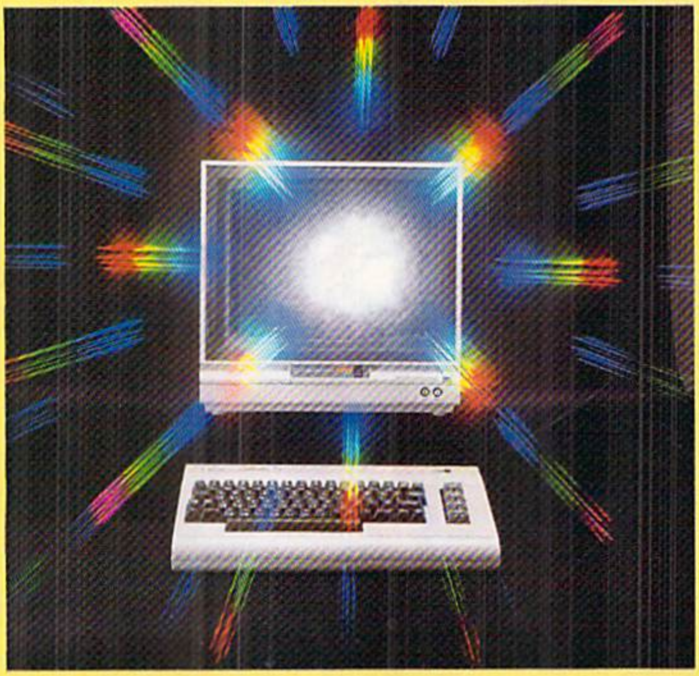
"Programs by Users, for Users"

THE NEW MONTHLY PUBLICATION ON DISK
FOR YOUR C-64 AND C-128

10 powerful and exciting programs for your Commodore computers not seen in any other publication at a price hardly worth mentioning. Disk comes with a booklet with complete instructions for all programs.

MIGHTY MAN
Maneuver your Superman look-alike against superior beings.

WAR MAZE
Maneuver your tank through a maze, avoiding obstacles while fighting off your opponent.



PEGASUS QUEST
Arcade type game with amazing graphics. Help your Pegasus fight off the attacking dragons.

BIG CHIEF TABLET
A word processor made especially for people with eye problems. Utilizes large letters for easy viewing.

ALSO ON THIS DISK:
Alpha Eater: Choose your words carefully here. 1541 Commander: Helps cure those DOS blues. SCHNATHING: Not your ordinary dice game. MINEFIELD: You'll need a lot of strategy here. BLOODTEST: Another 'FANTASTIC VOYAGE' game. CASTLERUN: Arcade style adventure....

MICRO-TEK
P.O. BOX 1861
STATEN ISLAND, NY 10314

Please *RUSH* me the following order (postage and handling included):

	USA	FOREIGN	Back Issue
☐ Volume 5 (Mar. '87) issue of the "MAXI-DISK"	$ 12.95	$ 15.95	Vol. ☐
☐ 1 Year Subscription to the "MAXI-DISK"	$119.95	$139.95	

Make checks payable to Micro-Tek Software. New York residents add 8.25% sales tax.

Name____________ Address____________

City____________ State____________ Zip____________

ARE YOUR PROGRAMS GOOD ENOUGH

MICRO-TEK Software is looking for quality games, utilities or business programs written by you, the computer enthusiast, to share with your fellow hackers. At the same time, you can make extra cash and get the satisfaction and recognition you deserve.

MICRO-TEK publishes the **"MAXI-DISK." "MAXI-DISK"** is a C-64 program disk with 10 quality programs, not published by any other publication. A new and exciting program disk is produced each and every month. Our premier disk will be available November 1986.

If you are interested in submitting your programs, please observe the following rules:

1. **All programs must be written and owned by you and submitted on C-64 formatted disk.**
2. **Typed, double-spaced documentation must accompany the program.**
3. **Rejected submissions will only be returned with S.A.S.E.**
4. **Prices subject to quality and length of program.**
5. **Upon acceptance, you will be sent a contract to which you must sign and return.**

MICRO-TEK Software pays generous royalties to programmers based on the number of disks sold for as long as the disk is for sale.

RESCUE 128

By Buck Childress

Oh, no! You just typed NEW and hit RETURN. Sure, you meant to type LIST, but your mind wandered for a split second. An incredible work of art has just been hurled into oblivion…or has it? Don't pull your hair out yet. Call *Rescue 128* to the rescue. *Rescue 128* recovers that lost jewel from the Great Microchip in the Sky.

Whenever you NEW a program, it isn't actually removed from memory. The C-128 just resets a few pointers and gives the appearance of being vacuum packed (empty). As long as you don't enter any new lines, load a different program, or turn the computer off, your creation can be rescued. All you have to do is change the pointers back to where they were before you typed NEW. It's simple enough to do, with *Rescue 128*.

After you've entered and saved a copy of *Rescue 128*, run it. The loader POKEs the machine language data into an area of memory totally separate from BASIC RAM, then prepares to make a save to this data directly from memory. By saving the data in this manner, you'll have a 100% machine language utility that loads directly into the area of memory it was saved from. Loading it won't disturb your soon-to-be-awakened masterpiece currently hibernating in BASIC RAM. You'll be asked whether you want to have the machine language version saved to disk or tape. *Rescue 128* then creates the machine language utility "MLRESCUE". This is the program which you'll need to use whenever you have to perform any rescues.

Let's say you've accidentally NEWed your latest gem and have calmed down enough to peel yourself off the ceiling. Take a deep breath and prepare to rescue your pride and joy. If you're using a disk drive, type LOAD "MLRESCUE",8,1 and press RETURN. For tape drive, type LOAD "MLRESCUE",1,1 and press RETURN. Be sure to type it as shown. When MLRESCUE has finished loading, type NEW and press RETURN. Now just type SYS 6912, press RETURN, and list your program. Bingo! You'll see your once-lost masterpiece in all its splendored glory. That's all there is to it.

For safety's sake, I strongly suggest you save your resurrected goodie before you do anything else. Unless, of course, you want to tempt fate one more time. □

SEE PROGRAM LISTING ON PAGE 113

C-64 COMPRESSOR

By Scott Miller Petty

How many times have you realized the limitations of your disk drive—namely the lack of space that the 1541 allows on each disk for storage? 664 blocks of disk space are very few indeed when you are storing large files such as high-resolution screens, lengthy sequential files, or simply big programs. How many times have you drawn intricate and beautiful high-resolution screens with your drawing utility, and been unable to efficiently use those drawings in your programs?

The utilities that accompany this article will put an end to these frustrations. With the machine language subroutine *Compressor* you will now be able to compress any area of RAM, including the RAM under the BASIC and Kernal ROMs! After saving the compressed file to your disk, decompression is just a SYS call away by using *Decompressor,* the other ML program accompanying this article. Additionally, two short BASIC programs are included—*Picmasher* and *Decomp Demo*—which will convert *Koala Painter, Micro-Illustrator,* and various other multicolor hi-res pictures into a common, compressed format that can be easily and efficiently loaded and viewed within BASIC programs.

So many advantages can be obtained by using files compressed by *Compressor:*

1. Saved storage space: for example, the high-res picture PIC.GIRL that comes with the Tech Sketch *Micro-Illustrator* drawing package normally occupies 40 blocks of disk space. After compression, PIC.GIRL takes up only 12 blocks of disk space.

2. Smaller files load faster: PIC.GIRL, before compression, loads in 28 seconds on an unmodified 1541 disk drive. Following compression, PIC.GIRL loads in a quick 10 seconds.

3. Decompression by *Decompressor* is nearly instantaneous: *Decompressor* is able to 'uncrunch' a 10K file in less than one second.

4. Load most hi-res pictures with the ease of a few SYS calls: By using the program *Picmasher,* most commercial (and private) multicolor high-resolution pictures can be converted into a common, shortened format. Before writing *Picmasher,* I had only two options when loading hi-res pictures into my programs. One method, the method supplied by *Micro-Illustrator* and *Koala Painter,* involved loading the 10K picture into an area of free RAM and then relocating that picture with ML subroutines. Unfortunately, the programmer must leave a 10K buffer within his or her program so that the picture can be loaded into this buffer prior to relocation. And the location of this buffer is often not ideal—*Micro-Illustrator* files load from 6364 to 16384, leaving a scant 4K of RAM in bank 0 in which a BASIC program can reside. The second method involves the splitting of each 40-block picture file into three parts and resaving these "picparts" to your disk. The largest part, a 32-block, 8K section of the picture, contains the data for the bit-map, which determines whether each of the 8000 pixels on your TV or monitor screen is on (lights up) or off. The other two parts, both requiring 1K of memory (four blocks of disk space), determine the colors of those 8000 pixels. After splitting the picture files into these components, each component can be directly loaded into its appropriate RAM location. As you can see, loading, splitting, resaving, and reloading each picture can make for big headaches and still shares some major drawbacks with the first option: both options still take up 40 blocks of precious disk space, and both options still require the time associated with loading 10K of data into your computer's memory. *Picmasher* will transform these cumbersome, 40 block long picture files into smaller, faster loading files—most of these files will load in under the BASIC or Kernal ROMs, without occupying a single byte of free RAM!

USING COMPRESSOR

Compressor is a 417-byte ML subroutine that takes any area of RAM, including the RAM under the BASIC ROM (40960-49151) and the RAM under the Kernal ROM (57344-65535), and through a series of calculations compresses that area of memory. The compressed data can again be placed in any area of RAM in the C-64. A short save routine is built into *Compressor* and can be used to save the compressed data. To compress an area of RAM, use the following format:

```
SYS CP, SA, PA, RA
```

CP stands for the starting address of the ML program *Compressor,* which, as written, is equal to 49152 (however, *Compressor* can be relocated with *Relocator*—see below). SA denotes the starting address of the area of RAM which you want to crunch. PA stands for the starting address, in RAM, where *Compressor* should place the compressed data. Finally, RA stands for the number of bytes, starting at SA, which should be compressed. Thus, if you want to compress the memory from 10000 to 19000 (which is 9000 bytes of memory) and place the compressed data starting at 20000 (with the ML for *Com-*

Why Are We Giving Away Such Famous Nationally Advertised First Quality Designer Jeans As

★ Calvin Klein ★ Jordache ★ Sasson

each pair for only a $1

Plus Shipping & Handling
THIS PRICE IS NOT A MISPRINT!

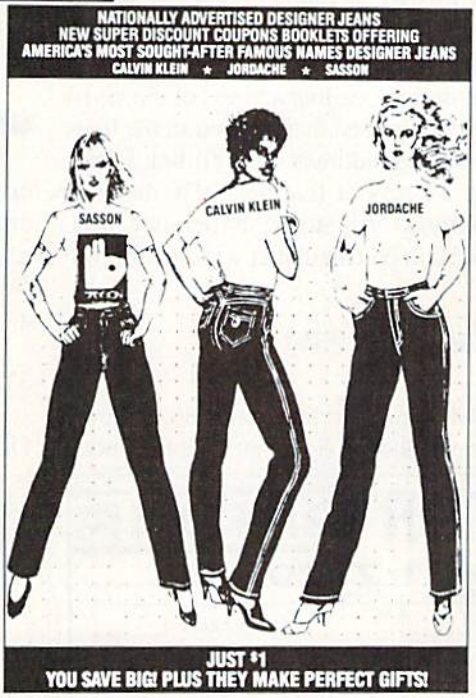
SUPER DISCOUNT COUPON

everytime you buy another pair at our regular low retail price? Currently only $28 a pair.

Until midnight June 25, 1987 — we will give you these booklets of ten $1 coupons for only $10 Per Booklet Of Ten $1 Coupons

Good for any 10 Famous Designer Jeans. Values of $280 or more!

- Super Discount Coupons Are Guaranteed Redeemable One-By-One Or As Many As You Like At A Time.
- No Need To Use Up Your Coupons All At Once, If You Don't Want To — Coupons Are Redeemable Until January 10, 1989.



As part of a nationwide publicity campaign, an innovatively bold, pioneering North Carolina firm will give away one million (1,000,000) Guaranteed Super Discount Famous Designer Jeans Coupons Booklets for the Shocking Publicity Price of only $10 a booklet to every person who reads this publicity campaign ad and writes to the company address (below) before midnight, June 25, 1987.

You absolutely must send this Original Publicity ad along with your request. No copies or Photostats accepted.

Please note that — even though the company's astonishing price of $10 per coupons booklet will expire on the above mentioned June 25, 1987 date — however, you will be allowed a much longer time period to redeem your super Discount Famous Designer Jeans Coupons. A $280.00 value.

The company guarantees that it will promptly, redeem all coupons sent in for redemption — all the way up until January 10, 1989. That's plenty of time for you to use up all your coupons. Also you are permitted to transfer your coupons to someone else to redeem, if you wish. These Super Discount Coupons make excellent gifts too.

Each Super Discount Coupons Booklet contains 10 coupons, which can be redeemed for 10 pairs of the famous nationally advertised Calvin Klein, Jordache and Sasson Designer Jeans. No seconds, or irregulars. All are new first quality designer jeans that sell for up to $40 or more at many local stores.

These are the same popular, nationally advertised Designer Jeans Super Discount Coupons Booklets you may have already heard about.

Now, you can own all the fashionable, designer name jeans, that you want. You too can enjoy the fabulous savings that Super Discount Coupons bring.

Don't risk missing out by responding too late! These are the fastest selling, and most sought-after Super Discount famous Designer Jeans Coupons ever sold by this most enterprising North Carolina firm.

These popular, Nationally Advertised Super Discount Jeans Coupons will not be sold at this price by the company in any store. There is a limit of just Two (2) booklets per address at this price, but if your request is sent early enough (before June 10) you are allowed to request up to 5. Each booklet is strongly backed by the company's full one-year money-back guarantee.

To order your Guaranteed Famous Designer Jeans Super Discount Coupons mail this entire original publicity ad (no copies or photostats accepted) along with your name and address and $10 for each Coupons booklet. Add only $1 shipping per booklet ordered (North Carolina residents add sales tax.) Allow up to 3 to 5 weeks for shipment. Make check payable to Designer Jeans Clearinghouse.

Mail to Designer Jeans Coupons Booklets, Dept. AM-1, 110 West 5th Street, Winston-Salem, North Carolina 27101.

Don't forget — This Amazing Low Price Offer Expires June 25, 1987 To Readers Of This Publication.

Just try finding such famous nationally advertised Designer Jeans in any store anywhere — at the astonishingly low price of only $1 each! Just a mere $10 for a booklet that's redeemable for 10 pairs of famous Designer Jeans . . . a value of $280 or more!

pressor at 49152), you would type

```
SYS 49152, 10000, 20000, 9000
```

To save the compressed data:

```
OPEN2,8,2,"filename of compressed file,P
,W"
SYS CP+324, SA, EA, LA:CLOSE2
```

Here, CP+324 is the starting address of *Compressor* + 324 (if *Compressor* resides at 49152, CP+324 would equal 49476). SA denotes the starting address of the data to be saved, EA denotes the ending address of that data, and LA stands for the desired loading address of the saved file. Thus to save the compressed data created in the lines above we know the starting address (20000) but do not yet know the ending address of that data. The last address POKEd by *Compressor* is stored in memory locations 253 and 254 and can be calculated with the following line:

```
EA=PEEK(253)+256*PEEK(254)
```

Thus with SA = 20000, EA = value calculated above, and LA = any value we choose (let's say 40960—under the BASIC ROM), to save our file:

```
OPEN2,8,2,"compressed file,P,W"
SYSCP+324, 20000, EA, 40960:CLOSE2
```

The new, compressed file COMPRESSED DATA will load at 40960 and can be decompressed with *Decompressor* as shown below. Notice that by specifying the loading address LA to be 40960, no free RAM need be allocated for the compressed file to be loaded into your C-64. Another locale that can be used as a buffer when loading in compressed files—one that also uses no free RAM—is under the Kernal ROM at locations 57344-65535. Now, let's find out how to decompress our crunched files.

USING DECOMPRESSOR

Decompressor is a 255-byte ML program which uncrunches compressed disk files or areas of memory crunched by *Compressor.* There are, again, two ways to use *Decompressor,* depending on whether or not you wish *Decompressor* to load in a compressed file. To load in a compressed file and to decompress that file:

```
SYS DC, F$, LA, DA
```

DC stands for the start address of *Decompressor* which is relocatable (with *Relocator*) and, as written, equals 49152. F$ denotes the filename of the compressed file. LA represents the load address of that file, while DA stands for the destination address of the decompressed data. Thus, to reverse the compression that we carried out above:

```
SYS DC, "compressed data", 40960, 10000
```

It's that easy! The data from 10000-19000 is restored to its original state when we first created the file COMPRESSED DATA. Another method can be used if you do not wish to load in a compressed file (the compressed data must be already resident somehere in RAM). The format is as follows, with DC, LA, and DA having the same connotations:

```
SYS DC+26, LA, DA
```

Here LA represents the start of the area in memory to be decompressed, not the loading address of a file. Finally, let's look at *Picmasher* and *Decomp Demo,* two short BASIC programs that reveal some of the applications which *Compressor* and *Decompressor* can be used for.

PICMASHER

This program converts multicolor high-resolution picture files, such as those created with *Micro-Illustrator* and *Koala Painter,* into a common, compressed format which loads in at any user-specified address. If you will

Continued on page 114

TIPS AHOY!

Compiled by Michael R. Davila

Send your best short routines and hints to *Tips Ahoy!*, c/o *Ahoy!* Magazine, Ion International Inc., 45 West 34th Street—Suite 407, New York, NY 10001. Payment is made on acceptance.

40 COLUMNS IN 80 COLUMN MODE

Okay, I know what you're thinking: Why would someone want 40 columns on an 80 column capable computer? I have several good reasons. First of all, not everyone likes 80 columns. I myself think it's a nice feature, though. If you wear glasses and can't see very well, this also applies. Secondly, for those of you who are programmers know what happens to the 40 column screen when you enter FAST mode. (For those who don't, the screen blanks.) In 80 columns, FAST mode doesn't affect the new 8563 VDC chip. Thirdly, those who have written programs for their 64s and are in the process of converting a 40 column program into an 80 column program don't have to bother; just use my routine below. And my final reason: To switch from 80 to 40 columns, you first have to switch the mode on the monitor, press either ESC then X or press the 40/80 key, and then RUN STOP and RESTORE. My routine totally eliminates this. The program listing below must be carefully typed in, or a crash could occur. The program is written for a 1902 monitor (*not* a 1902A). Note there are changes after the program for those who own a 1902A type monitor.

```
·10 FAST
·20 COLOR6,1:COLOR5,8:WINDOW0,1,39,24,1
·30 FOR A=1TO16 STEP2:READ B,C
·40 POKE 54784,B :POKE 54785,C: NEXT
·50 PRINT" YOU NOW HAVE A 40 COLUMN SCREE
N."
·60 DATA 1,40,2,116,6,24,8,11
·70 DATA 13,79,22,136,25,80,27,40
```

CHANGES FOR 1902A MONITOR

```
·30 FOR A=1TO20 STEP2:READ B,C
·60 DATA 1 ,40,2,116,6,24,7,31,8,11,9,232
```

The program reprograms the synchronization of the horizontal axis by changing several registers oriented with the display routine in the RGBI 80 column mode. Remember to save the program to disk for future reference.

—Robert J. Tiess
Middletown, NY

SPRITE LISTER

One of the most useful features of the C-128 is the SPRite DEFinition mode. The question is, once you've designed one, how do you preserve it for posterity or future use (whichever comes first)? It can be saved to disk using the BSAVE command, but that doesn't do much on paper.

This routine, added to an existing program, asks for the sprite number, a starting line number, and a line increment. It then prints a DATA listing of the sprite and a FOR-NEXT loop to save it in the appropriate place. The cursor is homed, and 11 RETURNs make the sprite a part of the program with no further effort.

It may not be the perfect method, but it beats whatever's in second place.

—Bob Renaud
Pittsfield, MA

```
·63000 PUDEF"0":A$="[4"#"]":B$="[3"#"],"
·63010 INPUT"[CLEAR][DOWN][DOWN]SPRITE #
(1 TO 8)";N
·63020 IFN<1ORN>8GOTO63000
·63030 A=3584+(N-1)*64:S=A:F=A+62
·63040 INPUT"[DOWN]ENTER START LINE NUMBE
R";L
·63050 INPUT"[DOWN]ENTER LINE # INCREMENT
";I
·63060 PRINT"[CLEAR]"L"REM [3"*"] SPRITE
#"N
·63070 L=L+I:FORJ=1TO9:PRINTL"DATA ";
·63080 FORK=1TO7:PRINTUSINGB$;PEEK(A);
·63090 A=A+1:NEXT:PRINT"[LEFT] ":L=L+I:NE
XT
·63100 PRINTL"FORJ=";:PRINTUSINGA$;S;
·63110 PRINT"TO";:PRINTUSINGA$;F;
·63120 PRINT":READD:POKEJ,D:NEXT":END
```

INSTANT FREE RAM CHECK

Using the FRE (dummy) command on the C-64 can be a pain in the diode for two reasons. First of all, what is the dummy for? It isn't used in the calculation. Couldn't the command just have been FREE or FRE? Second, sometimes the number returned by the FRE (dummy) command is negative, and to find the real amount of memory remaining you have to add 65536 to the result of the command.

My program, *F-RAM Check,* abolishes this problem. *F-RAM Check* places an ML routine in memory (I place it starting at location 679, but you can place it elsewhere by changing the value of S in line 10). My ML routine uses built-in ROM subroutines to find the amount of free memory. For the calculation, the routine calculates the difference between the end of BASIC arrays (also the end of BASIC variables) and the end of BASIC memory space. The end of arrays is stored as the normal low byte, high byte standard at locations 49 and 50. The end of BASIC memory space is in locations 55 and 56, also in low byte, high byte standard.

To use *F-RAM Check*, type in and RUN the program. If you are informed of an error, check your DATA statements. If everything is as it should be, you will be told what location to SYS. For a test, run the program and SYS the right location. Surprise! Don't worry, everything is intact. Now, use the old FRE (dummy) command to compare. There may be a difference of a few bytes between the two results occasionally, but *F-RAM Check* is more accurate. For a quick, easy, accurate, and familiar display of the amount of remaining BASIC bytes free, just SYS the routine at any time. You can even use it in a program! —Charles Batson III
Bolingbrook, IL

```
·10 S=679:CK=0:FORI=STOS+34:READB:POKEI,B
:CK=CK+B:NEXT
·20 IFCK=4169THENPRINT"DATA OK. SYS"S"TO
CHECK # OF FREE":PRINT"BYTES.":END
·30 PRINT"ERROR IN DATA STATEMENTS.":POKE
S,0:END
·40 DATA165,49,164,50,32,8,164,169,115,16
0,228,32,30,171,165,55,56,229,49,170
·50 DATA165,56,229,50,32,205,189,169,96,1
60,228,32,30,171,96
```

HACKING AND SIPPING

In days of olde it was my habit, after a hard day's work, to place myself in front of a TV screen and do in a six pack during the course of an evening. Now that computing has become my hobby, I prefer my monitor over my TV. It soon became apparent, however, that after just a few beers I no longer had the concentration necessary for serious programming. I solved this problem by switching to one of the new low alcohol brews. Now I can hack and sip as long as I like. —Ed Horgan
Coatesville, PA

SIMPLE SCROLL

While playing around with the MID$ command on my C-64, I made a little routine which acts as a great attention-getter as a program subroutine, or all on its own. Simply RUN it, type in your message, and respond to the VIEWING AREA? prompt with the number of characters of your message that you want displayed at a time. Your message will be automatically centered, and will start to scroll across your screen.

```
·10 INPUT"MESSAGE";M$:INPUT"VIEWING AREA"
;VA:PRINT"[CLEAR]":B$=M$+"[3"."]"
·20 A=18-(LEN(M$)/2):IF VA<LEN(M$) THEN A
=20-(VA/2)
·30 B$=RIGHT$(B$,LEN(B$)-1)+LEFT$(B$,1):C
$=LEFT$(B$,VA):PRINT"[HOME][DOWN]"TAB(A)
C$
·40 FOR X=1 TO 70:NEXT:GOTO 30
```

—Andrew Millen
Asbestos, Quebec

SID MAXIMIZE

While a sound is still in its release phase, you should wait until it is finished before trying to use the same voice again. If a voice is releasing, and you try turning it on to make another sound, what usually happens is that the voice will simply ignore your attempt and finish the sound it is currently doing. This means that if you want a voice to be repeatedly turned on and off, you must give it a very brief release stage. Otherwise, some of the sounds may not be heard at all. If you have noticed that some of your sounds are not being heard, this may be why.

However, during a voice's release, you can still change some of its other features, such as the frequency or waveform. Nice sound effects can be produced this way.

It has become common practice for machine language programmers to use voice 3 to provide random numbers for their routines. (When set to the Noise waveform, Voice 3 generates random frequencies which can then be read from Register 27, at address 54299. The numbers will always be in the range 0 to 255.) One might think that turning off the voice's gate bit would stop the flow of random numbers. It doesn't. Even when the voice is off, it continues to generate random values as long as it is set up for the Noise waveform (that is, as long as its waveform register contains the number 128 or higher). This way, you can use the voice freely for noise sound effects,

and for random numbers at the same time. Just be sure that when the sound is turned off, it's done by storing the number 128 (not 0) in the waveform register. Of course, you could silence the voice by turning on bit 7 of Register 24, but then the voice would end abruptly, and you could not hear its release phase.

It's known that a voice's frequency registers control the pitch of its sound. But did you know that when Voice 3 is used for random number generation, its frequency also controls how *quickly* the numbers will be produced? The higher the pitch, the more often the random values change. This means that if the frequency is very low, the numbers read from Register 27 will remain the same for long periods of time before a new number appears. Since machine language is very fast, you must provide high frequency for the voice, to ensure that the numbers will keep pace with the program. —Robert Masters
Central Square, NY

APPENDING PROGRAMS ON THE C-128

This short utility makes it easy to combine BASIC programs on the C-128. The program takes advantage of the 128's programmable function keys and its ability to create windows. The program redefines the f1 and f4 keys, prints instructions in a window on the screen, and ends.

Run the program. When the READY prompt appears, load the first program. Hit the f1 key and then load the program you wish to append. If more than two programs are to be combined, hit f1 again and load the next program. Continue until all programs to be combined are loaded. Hitting the f4 key clears the screen and combines the programs. If any of the line numbers are the same, renumber the new program before saving and running it. It couldn't be easier! You don't have to remember anything. The directions are protected in a window, so you won't lose them. Reset the computer to return the function keys to normal, after saving the new program.

Here's how it works. Line one redefines the f1 key to print commands on the screen and then execute them. The commands calculate the ending address of the program in memory and moves the start of BASIC up to this location. The commands are printed in the background color so they can not be seen. Line two redefines the f4 key to move the BASIC pointers back to normal and clear the screen. The remaining lines print the directions onscreen and create the window.

```
·1 KEY 1,CHR$(151)+" A = PEEK(4624)+PEEK(
4625)*256-2: C=INT(A/256): B=A-C*256: PO
KE 45,B: POKE 46,C"+ CHR$(153) + CHR$(13
)
·2 KEY 4,CHR$(151)+" POKE 45,1: POKE 46,2
8: WINDOW 0,0,39,24,1"+CHR$(153) + CHR$(
13)
·3 PRINT CHR$(147)+CHR$(17)"[3" "]TO APPE
ND.. FOLLOW THESE STEPS": PRINT CHR$(17)
"1 LOAD FIRST PROGRAM": PRINT"2 HIT F1 K
EY"
```

```
•4 PRINT"3 LOAD PROGRAM TO BE APPENDED":
 PRINT"4 HIT F4"
•5 PRINT"5 RENUMBER AND SAVE NEW PROGRAM"
 :PRINT"6 RESET COMPUTER":WINDOW 1,10,39,
 24,1
```

—Earl Caid
Jackson, MO

AMIGALIKE 128 RESOLUTION

Many of you out there who are the happy owners of one of Commodore's latest computers, the 128, may have noticed the great attention given to their other new invention, the AMIGA. The 128 is the only computer in the Commodore family that has 80 columns. The resolution in 80-column mode is good. However, it can be improved. Those of you that are not quite familiar with the innards of the 128 might not be aware of the new, powerful 8564 VDC chip. This chip is dedicated the 128's 80-column mode. With a little experimentation, I have discovered one of the registers that controls the vertical resolution of the 80-column text screen. The register contains the value for the number of raster lines per character. So logically if you increase the value, you will get a crisper image. Before I show you this rather simple trick, I find it necessary to explain the routine of accessing the VDC chip. The chip contains only two registers. The first register is the register you wish to PEEK or POKE. The second register is the actual PEEK/POKE value. The two registers are below:

```
POKE 54784,9 : POKE 54785,233 <RETURN>
```

I must also mention that it is extremely necessary to type the two POKE values in on one line, not separately. It is also worthy of note that to achieve this trick you must own a COMMODORE 1902A RGB MONITOR (not the 1902), though I do not know why.

To restore the screen back to normal, you have two options. The first is the customary pressing of the RUN STOP and RESTORE keys, or by typing in:

```
POKE 54784,9 : POKE 54785,231 <RETURN>
```

—Robert J. Tiess
Middletown, NY

READY CHANGER

Wouldn't it be nice if you could change the "READY" prompt on the Commodore 64 to any word you desired? Maybe even change it to your name, or to useful words like LIST, RUN, SAVE, LOAD, etc., to reduce the amount of typing it takes to create a program?

Now you can with *Ready Changer.* Simply type in and SAVE the following program. When you RUN it, you will be prompted to enter a word up to 6 letters long. After typing it in and hitting the RETURN key, your word will replace the "READY" prompt in a split second!

Some things to remember about *Ready Changer* are: (1) Be sure to type in the program exactly as it is shown or it will not work. (2) There can be no punctuation, spaces, or characters other than the letters A thru Z in your word. (3) If you must do a RUN STOP/RESTORE, just execute a POKE 1,54 and your word will be restored.

```
•5 FORX=88TO96:READY:POKEX,Y:NEXT:SYS4191
 9:POKE 1,54
•10 DATA 0,192,0,192,0,0,0,0,160
•15 X=41848:Y=1136:Z=160
•20 PRINT"[CLEAR]THE WORD 'READY.' CAN BE
 REPLACED BY ANY WORD UP TO 6 LETTERS LO
NG."
•25 INPUT"WHAT WORD DO YOU WANT IT TO BE"
 ;A$
•30 IF PEEK(1142) <> 32 THEN PRINT"[3"[DO
WN]"]TOO MANY LETTERS":FORD=1TO2000:NEXT
D:GOTO15
•35 L=PEEK(Y):IFL=32 THEN FOR X=XTO41853:
POKE X,Z: NEXTX:END
•40 POKE X,L+64:X=X+1:Y=Y+1:IF Y=1142 THE
N END
•45 GOTO 35
```

—David S. Krause
Grissom AFB, IN

COMMODARES

By Dale Rupert

Each month, we'll present several challenges designed to stimulate your synapses and toggle the bits in your cerebral random access memory. We invite you to send your solutions to:

Commodares, c/o *Ahoy!*
P.O. Box 723
Bethel, CT 06801

We will print and discuss the cleverest, simplest, shortest, most interesting and/or most unusual solutions. Be sure to identify the *name* and *number* of the problems you are solving. Also show sample runs if possible. Be sure to tell what makes your solutions unique or interesting, if they are.

Programs on diskette (1541 format only) are welcome, but they must be accompanied by listings. You must enclose a stamped, self-addressed envelope if you want any of your materials returned. Solutions received by the middle of the month shown on the magazine cover are most likely to be discussed, but you may send solutions and comments any time. Your original programming problems, suggestions, and ideas are equally welcome. The best ones will become *Commodares*!

PROBLEM #39-1: EXPONENTIAL POWER

Here is a problem sent by Nolan Whitaker (Jeffersonville, KY) which was given at a high school computer team competition. The EXP(X) function in BASIC calculates the transcendental number e (approximately 2.71828) raised to the Xth power. EXP(X) can be approximated by the expression:

```
1 + (X^1/1!) + (X^2/2!) + (X^3/3!) +...+
(X^N/N!)
```

where N! (N factorial) = 1 * 2 * 3 ... * N and X ↑ N means X raised to the Nth power.

The user enters values for X and N. For example, if X=1 and N=2, the program displays:

```
E TO THE POWER OF 1 IS APPROXIMATELY 2.5
```

PROBLEM #39-2: ELECTRIC POWER

Here's one for novices and experts alike submitted by Steven Steckler (Columbia, MD). The power company's rate schedule looks like this:

12 kilowatt-hours (kWH) or less	= $2.79
next 78 kHW or less	= 0.1259 cents per kWH
next 510 kWH or less	= 0.1052 cents per kWH
balance over 600 kWH	= 0.0928 cents per kWH

Write a program which asks the user to input his current and previous meter readings (in kWH). The program then calculates and displays the amount due the power company.

PROBLEM #39-3: BINARY POWER

This is based on a program sent by Dr. Curryfavor's alter ego Eddie Johnson (Albuquerque, NM). The user enters an integer value from 0 to 255. The computer displays 1) the binary (base-2) equivalent of that number, 2) the binary "mirror image" of that number, and 3) the decimal value of this "mirror image" number. The mirror image is formed by taking the bits of the first number and putting them in reverse order. For example, if the user enters 130, the computer displays the three results 10000010, 01000001, and 65. Dr. Curryfavor uses his routine to create a backwards character set. Perhaps you advanced programmers might try the same.

PROBLEM #39-4: ROOT POWER

We all know that every number is equal to the square root of its square. Three equals the square root of nine. Four equals the square root of sixteen. Unfortunately the computer can only approximate the square root function, and it will tell you that SQR(3 ↑ 2) does not equal 3. It will even tell you that SQR(3*3) does not equal three.

Write a program to display only those numbers for which the SQR function of the square of the number is equal to the number. Try both exponentiation and multiplication for calculating the square and compare your results. Send your conclusions.

Stop the presses! Don't print those schedules for the next five seasons of intermural underwater volleyball yet. You must make two changes to the solution of *Problem #32-3: Round Robin (Commodares*, November 1986) before it will work properly for all teams. In lines 150 and 160, change T$(K+N/2) to T$(N − K − 1).

Many thanks to Charles Kluepfel (Bloomfield, NJ) for being the first to send this correction. Thanks to all others who called and wrote about it. If you find your team stuck at the bottom of the pool against the same team for thirty games in a row, tell the coach to change those two lines in his scheduling program (but not if you're winning, of course).

Here are a couple of items before we look at *Commodares* from November 1986. Paul Sobolik (Pittsburgh, PA) pointed out that it is possible to compress numeric data for storage on disk. The integer 125 would normally take up six bytes if you used X%=125 : PRINT#8,X% (see *Tons of Data* in the November 1986 *Rupert Report*). Paul suggested this encoding scheme so that unsigned integers from 0 to 65,535 could be stored in two bytes:

```
X=125 : XH=INT(X/256) : XL=X-XH*256
PRINT#8,CHR$(XH)CHR$(XL);
```

To retrieve the data, use this:

```
GET#8,XH$,XL$ : X=ASC(XH$+CHR$(0))*256 +
ASC(XL$+CHR$(0))
```

Of course your program must properly OPEN and CLOSE the data file. A BASIC bug causes the ASC function of a null string to give an "Illegal Quantity Error" on the C-64. The CHR$(0)'s bypass the bug and are not needed for the C-128.

With a similar method, unsigned integers up to 16,777,216 (2 to the 24th power) could be stored in only three bytes, and integers from 0 to 15 take only a nibble apiece.

Necah Buyukdura (Ankara, Turkey) suggested the following solution to October 1986's *#34-3: Digit Decomposition.*

```
•1 REM COMMODARES PROBLEM #34-3:
•2 REM     DIGIT DECOMPOSITION
•3 REM SOLUTION BY
•4 REM     NECAH BUYUKDURA
•5 REM
•10 CT=208 : BF=842 :REM C-128 KBD BUFFER
•20 IF DS$="" THEN CT=198 : BF=631 :REM
 C-64 KBD BUFFER
•30 POKE CT,0 : WAIT CT,1
•40 D=PEEK(BF)-48 : PRINT D; : S=S+D
•50 POKE CT,0 : WAIT CT,1
•60 IF PEEK(BF)<>13 THEN PRINT "+";: GOTO
 40
•70 PRINT "=" S
```

Several readers mentioned last month used a similar method of reading each keystroke directly from the keyboard buffer. The problem was to display each digit of a number separated by a plus sign with the sum of the digits displayed after the RETURN key is pressed. For example, the number 1234 is displayed as

```
1 + 2 + 3 + 4 = 10
```

Lines 10 and 20 choose the proper values for the keyboard buffer. A count of characters waiting in the buffer is kept in memory location 208 of the C-128 and 198 of the C-64. The actual keystroke characters go into a memory buffer starting at address 842 (C-128) and 631 (C-64). DS$ is a special disk status variable for the C-128. On the C-64 it is an ordinary, undefined null string. Therefore DS$=" " is true only for the C-64, and the keyboard buffer parameters are redefined.

Now for a look at the best solutions to the *Commodares* from the November 1986 issue. *Problem #35-1: Round About* from Bill Sinclair Jr. (Hurlock, MD) brought some very sophisticated solutions. The problem was to scroll a message counterclockwise around the outer perimeter of the screen in a marquee fashion. Daryl Bruner (Hartselle, AL) and Fred Simon (Gibbsboro, NJ) accepted the advanced programmer's challenge of writing this as a machine language interrupt routine so the message can be displayed even while another program is running. Fred's solution for the C-64 is listed below.

```
•1 REM COMMODARES PROBLEM #35-1:
•2 REM     ROUND ABOUT
•3 REM SOLUTION BY
•4 REM     FRED SIMON
•5 REM  *** FOR C-64 ***
•9 REM ===  FOR CCW MOTION:
•10 REM *REMOVE  REM  FROM LINES 150
•15 REM   AND 220
•20 REM *ADD  REM  TO START OF LINES 140
•25 REM   AND 210
•30 REM *CHANGE CC=22481 IN LINE 40
•35 REM   TO CC=22587
•40 CC=22481
•50 INPUT"ENTER STRING:";W$:W$=CHR$(32)+W
$+CHR$(32)
•60 SP=20 :REM # OF 1/60TH SECOND DELAYS
 BETWEEN INTERRUPTS
•70 FOR AD=49152 TO 49311:READ X:POKE AD,
X :CK=CK+X:NEXT
•80 IF CK<>CC THEN PRINT  "ERROR IN DATA
STATEMENTS" : END
•90 POKE 49284,LEN(W$):FOR I=1 TO LEN(W$)
:POKE 49311+I,ASC(MID$(W$,I,1)):NEXT
•100 POKE 792,0:POKE 793,192:POKE 56589,1
27:POKE 56589,130:POKE 56580,26
•110 POKE 56581,20:POKE 56590,17:POKE 565
82,SP:POKE 56583,0
•120 PRINT CHR$(14)CHR$(147):POKE 56591,8
1:END
•130 DATA 72,138,72,152,72,160,0,185,0,0,
153,0,193,200,208,247,132,251,173,159
•140 DATA 192,201,126,144,5,169,0,141,159
,192,133,252,165,252,41,127
•150 REM DATA 192,234,234,16,5,169,125,14
1,159,192,133,252,165,252,41,127
•160 DATA 201,40,176,9,133,211,169,0,133,
214,76,110,192,233,39,201,25,176,9,133
•170 DATA 214,169,39,133,211,76,110,192,2
33,24,201,40,176,15,133,250,169,40
•180 DATA 229,250,133,211,169,24,133,214,
76,110,192,233,39,201,24,144,7,230
•190 DATA 252,230,252,76,32,192,133,250,1
69,25,229,250,133,214,169,0,133,211
•200 DATA 32,108,229,174,158,192,164,251,
185,160,192,168,32,24,234,230,252
•210 DATA 230,251,165,251,201,13,176,3,76
,32,192,238,159,192,160,0,185
•220 REM DATA 230,251,165,251,201,13,176,
3,76,32,192,206,159,192,160,0,185
•230 DATA 0,193,153,0,0,200,208,247,172,1
3,221,76,94,254,1,0
```

Fred's program has a clockwise/counterclockwise op-

tion. As written, the program asks for the string to be displayed, and it scrolls the string clockwise around the screen. The speed of the motion is determined by the value of SP in line 60. When SP is 0, the string really flies. The larger the value, the slower the movement. The string must be less than 124 characters and should be entered in the upper/lower case mode (after pressing SHIFT-COMMODORE). To stop the program, either press the RUN STOP key or use POKE 56591,80 directly or from your program.

To make the string move counterclockwise, remove the REMs from lines 150 and 220 and add REMs at the beginning of lines 140 and 210. Also change the checksum total CC in line 40 to 22587. C-128 users should run this program in C-64 mode. As always, save this program *before* running it the first time. If there is an error in a DATA statement, line 80 will advise you of the fact. Check those numbers carefully.

Jim Speers (Niles, MI) and Ron Weiner (Levittown, PA) both created an array of the addresses around the perimeter of the screen, then sequentially POKEd the string values into those addresses. See the solution to *Centipede Scroller* in the December 1986 *Commodares* for an example of this method. Thanks also to Michael Drinkwater (Berwyn, IL) for his solution to this problem.

The solutions to *Problem #35-2: Series Sequence* suggested by James Bickers (Shepherdsville, KY) ranged in length from three lines to forty lines. The shortest solution came from Keith Kushner (Brooklyn, NY) and is listed below.

```
•1 REM COMMODARES PROBLEM #35-2:
•2 REM      SERIES SEQUENCE
•3 REM SOLUTION BY
•4 REM      KEITH KUSHNER
•5 REM
•10 Y=7:X=INT(Y/2)+1:Z=2[UPARROW]Y-1:FORT
 =0TOZ:B$="":W=0:C=T:FORV=1TOY:B=C:B=B/2:
 C=INT(B)
•20 C$=STR$(B>C):B$=RIGHT$(C$,1)+B$:W=W-(
 B>C):NEXTV:ON-(W=X)GOSUB30:NEXTT:END
•30 W=0:FORU=1TOY:Q=VAL(MID$(B$,U,1)):PRI
 NTCHR$(-(W<X)*(76+11*Q));:W=W+Q:NEXTU:PR
 INT:RETURN
```

Keith explained that the loop in lines 10 and 20 creates 2 to the Yth power binary strings from 0 to Z. The number of all possible wins and losses for Y games is 2 to the Yth power. W counts the number of wins which are 1's in each string. The ON−(W=X) statement selects all strings which have exactly X wins.

In line 30, W counts the wins and the CHR$ expression prints W or L, depending upon the value of Q. If X=W the series is over and the CHR$ value is 0. Change Y in line 10 to be the maximum number of games played. If Y is even, the series winner must win by two games. Be sure to use abbreviations on the C-64 to type line 30. There are 35 possible world series sequences, 20 of which are the full seven games long.

Congratulations to Howard G. Reiser (Joliet, IL), Karen Middaugh (San Diego, CA), Jim Speers (Niles, MI), David Hoffner (Brooklyn, NY), David Brouse and Troy Shoap (Shippensburg, PA), Paul Vaughan (San Jose, CA), and Ellis Hormats (Maitland, FL) for their solutions to this problem. Ellis mentioned that he lost a night's sleep on this problem. He thought of the algorithm just as he was dozing off, and he couldn't get back to sleep until he had worked out the program. Hopefully the world-renown of having your name published will make up for the lost sleep, Ellis. Thanks for writing.

Problem #35-3: Time Converter from Jim Speers (Niles, MI) brought quite a few solutions. The problem was to enter a number of hours in decimal format and have the computer convert it to hours:minutes:seconds format. The shortest solution was this COMAL program from Paul Sisul (St. Louis, MO):

```
0001 // commodares problem #35-3:
0002 //       time converter
0003 //        solution by
0004 //        paul sisul
0005 // comal solution
0006 t:=6.42135; h:=int(t); i:=3600*(t m
od h); m:=i div 60; s:=int((i mod 60)+.5
)
```

```
0007 print h,":",m,":",s
```

Paul's solution uses the integer operators MOD and DIV to easily get the number of seconds and minutes from the fractional number of hours. T stores the decimal number of hours.

Howard Reiser (Joliet, IL), Leo Brenneman (Erie, PA), and Karen Middaugh (San Diego, CA) all discussed the rounding problem when the decimal value of hours is 4.33333 for example. If the fraction is converted to minutes and then to seconds, the result may be 4:19:60 instead of the standard 4:20:00. Howard's solution to this problem is to convert fractional hours to seconds and then to calculate the number of minutes, both with proper rounding as shown in lines 30 and 40 of his program:

```
·1 REM COMMODARES PROBLEM #35-3:
·2 REM      TIME CONVERTER
·3 REM SOLUTION BY
·4 REM      HOWARD  G. REISER
·5 REM
·10 INPUT"NUMBER OF HOURS IN DECIMAL FORM
 ";HX
·20 H$=STR$(INT(HX))
·30 S=3600*(HX-INT(HX))+.5
·40 M=INT(S)/60:M$=" :"+STR$(INT(M))
·50 S$=" :"+STR$(INT((M-INT(M))*60+.5))
·60 PRINT HX;" HOURS = ";H$;M$;S$
```

Karen's and Leo's solutions simply calculated integer values of minutes and seconds, then tested to see if the number of seconds was 60. If so, it was set to zero and the number of minutes was incremented. Leo's solution below is interesting in its use of integer values H%, M%, and S%.

```
·1 REM COMMODARES PROBLEM #35-3:
·2 REM       TIME CONVERTER
·3 REM SOLUTION BY
·4 REM       LEO BRENNEMAN
·5 REM
·10 INPUT"TIME IN DECIMAL HOURS";H
·20 H%=H : M=H-H% :M=M*60 : M%=M : S=M-M%
  : S=S*60 : S%=S : IF S=>.5 THEN S%=S+1
·30 IF S%=>60 THEN M%=M%+1 : S%=0
·40 IF M%=>60 THEN H%=H%+1 : M%=0 : S%=0
·50 PRINT H% CHR$(58) M% CHR$(58) S%
```

Notice that H% = H in line 20 automatically performs the conversion from floating point form to integer. Try this to see how it works:

```
X=1.4 : X%=X : Y%=X+X : PRINT X,X%,Y%
```

X% is 1 and Y% is 2. When a positive floating point value is assigned to an integer variable, the decimal portion of the floating point number is chopped off (truncated). In general a floating point value is always converted to the next smaller integer. Change 1.4 to −1.4 to see that X% is now −2 and Y% is −3.

Some of the *Time Converter* solutions added AM or PM if the decimal number of hours was less than or greater than 12. Paul Mather (Warminster, ONT) used the C-128's PRINT USING statement to easily display the output this way:

```
PRINT USING"##:##:##";H;M;S
```

Dwight Jones (NASB, ME) added that the time-conversion routine is useful for astronomers and others doing angle conversions since degrees, minutes, and seconds are in the same ratio as hours, minutes, and seconds.

Thanks also to Wallace Leeker (Lemay, MO), John Czupowski (Wheeling, IL), Wayne Jorgensen (Monona, WI), and Jon Schoenfeld (East Chicago, IL) for their work on this problem.

Karen Middaugh (San Diego, CA) used her *Date Ditty* program discussed last month to solve *Problem #35-4: Bad Luck*. Her program asks for the current date. It then calculates the next occurrence of Friday the 13th.

```
·1 REM COMMODARES PROBLEM #35-4:
·2 REM        BAD LUCK
·3 REM SOLUTION BY
·4 REM   KAREN MIDDAUGH
·5 REM
·10 DIM P(12) : FOR J=1 TO 12 : READ P(J)
 :NEXT
·20 INPUT"YEAR: 19";Y: INPUT "MONTH (1-12
 ): ";M:INPUT "DAY: ";D:IF D>12 THEN 70
·30 L=INT((Y+3)/4):DA=6+Y+L+P(M)+13: IF I
 NT(Y/4)=Y/4 AND M>2 THEN DA=DA+1
·40 DA=INT((DA/7-INT(DA/7))*7+.5)
·50 IF DA=5 THEN PRINT"THE NEXT FRIDAY TH
 E 13TH IS"M"/13/"Y :END
·60 D=13
·70 M=M+1:IF M>12 THEN M=1:Y=Y+1
·80 GOTO 30
·90 DATA 0,3,3,6,1,4,6,2,5,7,3,5
```

Jim Speers (Niles, MI) went a step further and calculated all Friday the 13th's in the twentieth century. You can modify the program above to do the same thing. Remove the END statement at the end of line 50. Then run the program and enter 0, 1, and 1 for the year (1900), month, and date respectively. Stop the program when the year passes 1999. Jim said that there are 170 such Fridays this century. Thanks also to Paul Mather (Warminster, ONT) for his solution.

You might enjoy modifying this program further to perform other types of calendar analysis. Could there be a year without Friday the 13th? Could any year have more than three of them? What are the longest and shortest periods of time between these notorious days? Have fun with this month's challenges. And...watch out for black cats. ☐

PROGRAM LISTINGS

Attention new *Ahoy!* readers! You must read the following information very carefully prior to typing in programs listed in *Ahoy!* Certain Commodore characters, commands, and strings of characters and commands will appear in a special format. Follow the instructions and listing guide on this page.

On the following pages you'll find several programs that you can enter on your Commodore computer. But before doing so, read this entire page carefully.

To insure clear reproductions, *Ahoy!*'s program listings are generated on a daisy wheel printer, incapable of printing the commands and graphic characters used in Commodore programs. These are therefore represented by various codes enclosed in brackets [ ]. For example: the SHIFT CLR/HOME command is represented onscreen by a heart. The code we use in our listings is [CLEAR]. The chart below lists all such codes which you'll encounter in our listings, except for one other special case.

The other special case is the COMMODORE and SHIFT characters. On the front of most keys are two symbols. The symbol on the left is obtained by pressing that key while holding down the COMMODORE key; the symbol on the right, by pressing that key while holding down the SHIFT key. COMMODORE and SHIFT characters are represented in our listings by a lower-case "s" or "c" followed by the symbol of the key you must hit. COMMODORE J, for example, is represented by [c J], and SHIFT J by [s J].

Additionally, any character that occurs more than two times in a row will be displayed by a coded listing. For example, [3 "[LEFT]"] would be 3 CuRSoR left commands in a row, [5 "[s EP]"] would be 5 SHIFTed English Pounds, and so on. Multiple blank spaces will be noted in similar fashion: e.g., 22 spaces as [22 " "].

Sometimes you'll find a program line that's too long for the computer to accept (C-64 lines are a maximum of 80 characters, or 2 screen lines long; VIC 20 lines, a maximum of 88 characters, or 4 screen lines). To enter these lines, refer to the *BASIC Command Abbreviations Appendix* in your User Manual.

On the next page you'll find our *Bug Repellent* programs for the C-128 and C-64. The version appropriate for your machine will help you proofread our programs after you type them. (Please note: the *Bug Repellent* line codes that follow each program line, in the whited-out area, should *not* be typed in. See the instructions preceding each program.)

Also on the following page you will find *Flankspeed*, our ML entry program, and instructions on its use. ☐

Call *Ahoy!* at 212-239-0855 with any problems.

When You See	It Means	You Type	You Will See
[CLEAR]	Screen Clear	SHIFT CLR/HOME	
[HOME]	Home	CLR/HOME	
[UP]	Cursor Up	SHIFT ↑CRSR↓	
[DOWN]	Cursor Down	↑CRSR↓	
[LEFT]	Cursor Left	SHIFT ←CRSR→	
[RIGHT]	Cursor Right	←CRSR→	
[SS]	Shifted Space	SHIFT Space	
[INSERT]	Insert	SHIFT INST/DEL	
[DEL]	Delete	INST/DEL	
[RVSON]	Reverse On	CNTRL 9	
[RVSOFF]	Reverse Off	CNTRL 0	
[UPARROW]	Up Arrow	↑	
[BACKARROW]	Back Arrow	←	
[PI]	PI	π	
[EP]	English Pound	£	

When You See	It Means	You Type	You Will See
[BLACK]	Black	CNTRL 1	
[WHITE]	White	CNTRL 2	
[RED]	Red	CNTRL 3	
[CYAN]	Cyan	CNTRL 4	
[PURPLE]	Purple	CNTRL 5	
[GREEN]	Green	CNTRL 6	
[BLUE]	Blue	CNTRL 7	
[YELLOW]	Yellow	CNTRL 8	
[F1]	Function 1	F1	
[F2]	Function 2	SHIFT F1	
[F3]	Function 3	F3	
[F4]	Function 4	SHIFT F3	
[F5]	Function 5	F5	
[F6]	Function 6	SHIFT F5	
[F7]	Function 7	F7	
[F8]	Function 8	SHIFT F7	

BUG REPELLENT By MICHAEL KLEINERT and DAVID BARRON

Bug Repellent is a checksum program used for proofreading BASIC listings typed in from *Ahoy!* magazine. For each program line you enter, *Bug Repellent* will produce a two-letter code that should match the code listed beside that line in the magazine.

Type in, save, and run the *Bug Repellent.* (If you have a C-64, type in the C-64 version. If you have a C-128, you will need to type in the C-64 version for use with C-64 programs, and the C-128 version for use with C-128 programs.) If you have typed in *Bug Repellent* properly, you will get the message BUG REPELLENT INSTALLED; otherwise you will get an error message. If you get an error message, double check the *Bug Repellent* program for typing mistakes. Type NEW and hit RETURN. Then type in and save, or load, the *Ahoy!* program you wish to check. Type in SYS 49152 for the C-64 version or SYS 3072 for the C-128 version and hit RETURN (this will begin execution of *Bug Repellent*). You will see the prompt SCREEN OR PRINTER ? Hit S if you want the codes listed on the screen, or P if you want them listed on the printer. To pause the listing depress and hold the SHIFT key.

Compare the codes your machine generates to those listed to the right of the corresponding program lines. If you spot a difference, that line contains an error. Write down the numbers of the lines where the contradictions occur. LIST each line, locate the errors, and correct them.

COMMODORE 64 VERSION

```
·100 FOR X = 49152 TO 49488:READY:S=S+Y            AB
·110 IF Y<0 OR Y>255 THEN 130                      EA
·120 POKE X,Y:NEXT:GOTO140                         ID
·130 PRINT"[CLEAR][DOWN]**ERROR**":PRINT"[DOWN
]PLEASE CHECK LINE"PEEK(64)*256+PEEK(63):END      ID
·140 IF S<>44677 THEN PRINT"[CLEAR][DOWN]**ERR
OR**":PRINT"[DOWN]PLEASE CHECK DATA LINES 170
-500":END                                         HJ
·150 PRINT"[CLEAR]":POKE53280,0:POKE53281,6:PO
KE646,1                                           NP
·160 PRINT"[RVSON][6" "]C-64 BUG REPELLENT INS
TALLED[6" "]"                                     LF
·170 DATA32,161,192,165,43,133,251,165,44,133     DL
·180 DATA252,160,0,132,254,32,37,193,234,177      DB
·190 DATA251,208,3,76,138,192,230,251,208,2       OF
·200 DATA230,252,76,43,192,76,73,78,69,32         KN
·210 DATA35,32,0,169,35,160,192,32,30,171         CA
·220 DATA160,0,177,251,170,230,251,208,2,230      CE
·230 DATA252,177,251,32,205,189,169,58,32,210     JE
·240 DATA255,169,0,133,253,230,254,32,37,193      CL
·250 DATA234,165,253,160,0,76,13,193,133,253      NB
·260 DATA177,251,208,237,165,253,41,240,74,74     MB
·270 DATA74,74,24,105,65,32,210,255,165,253       EP
·280 DATA 41,15,24,105,65,32,210,255,169,13       GH
·290 DATA32,220,192,230,63,208,2,230,64,230       AN
·300 DATA251,208,2,230,252,76,11,192,169,153      NG
·310 DATA160,192,32,30,171,166,63,165,64,76       BF
·320 DATA231,192,96,76,73,78,69,83,58,32          EP
·330 DATA0,169,247,160,192,32,30,171,169,3        PJ
·340 DATA133,254,32,228,255,201,83,240,6,201      FK
·350 DATA80,208,245,230,254,32,210,255,169,4      FL
·360 DATA166,254,160,255,32,186,255,169,0,133     CL
·370 DATA63,133,64,133,2,32,189,255,32,192        GC
·380 DATA255,166,254,32,201,255,76,73,193,96      NN
·390 DATA32,210,255,173,141,2,41,1,208,249        NH
·400 DATA96,32,205,189,169,13,32,210,255,32       IM
·410 DATA204,255,169,4,76,195,255,147,83,67       KC
·420 DATA82,69,69,78,32,79,82,32,80,82            DC
·430 DATA 73,78,84,69,82,32,63,32,0,76            ML
·440 DATA44,193,234,177,251,201,32,240,6,138      GN
·450 DATA113,251,69,254,170,138,76,88,192,0       JK
·460 DATA0,0,0,230,251,208,2,230,252,96           NA
·470 DATA170,177,251,201,34,208,6,165,2,73        DM
·480 DATA255,133,2,165,2,208,218,177,251,201      JA
·490 DATA32,208,212,198,254,76,29,193,0,169       FM
·500 DATA13,76,210,255,0,0,0                      PA
```

COMMODORE 128 VERSION

```
·100 FAST:FOR X = 3072 TO 3520:READ Y:POKE X,Y
:S=S+Y:TRAP110:NEXT:SLOW                          IH
·110 SLOW:IF S<>49057 THEN PRINT"[CLEAR][DOWN]
**ERROR**":PRINT"[DOWN]PLEASE CHECK DATA LINE
S 140-390":END                                    JA
·120 PRINT"[CLEAR][DOWN]  C-128 BUG REPELLENT
INSTALLED"                                         II
·130 PRINT"[4" "]TYPE SYS 3072 TO ACTIVATE"        IN
·140 DATA 32,161,12,165,45,133,251,165,46,133,
252,160,0,132,254,32,37                            OF
·150 DATA 13,234,177,251,208,3,76,138,12,230,2
51,208,2,230,252,76,43                             NC
·160 DATA 12,76,73,78,69,32,35,32,0,169,35,160
,12,32,80,13,160,0,177                             OL
·170 DATA 251,170,230,251,208,2,230,252,177,25
1,32,89,13,169,58,32,98                            EF
·180 DATA 13,169,0,133,253,230,254,32,37,13,23
4,165,253,160,0,76,13                              JO
·190 DATA 13,133,253,177,251,208,237,165,253,4
1,240,74,74,74,74,24                               LC
·200 DATA 105,65,32,98,13,165,253,41,15,24,105
,65,32,98,13,169,13,32                             DE
·210 DATA 220,12,230,65,208,2,230,66,230,251,2
08,2,230,252,76,11,12                              GM
·220 DATA 169,153,160,12,32,80,13,166,65,165,6
6,76,231,12,96,76,73,78                            CP
·230 DATA 69,83,58,32,0,169,247,160,12,32,80,1
3,169,3,133,254,32,107                             HC
·240 DATA 13,201,83,240,6,201,80,208,245,230,2
54,32,98,13,169,4,166                              GK
·250 DATA 254,160,255,32,116,13,169,0,133,65,1
33,66,133,250,32,125,13                            LB
·260 DATA 32,134,13,166,254,32,143,13,76,73,13
,96,32,98,13,165,211                               JF
·270 DATA 234,41,1,208,249,96,32,89,13,169,13,
32,98,13,32,152,13,169,4                           GD
·280 DATA 76,161,13,147,83,67,82,69,69,78,32,7
9,82,32,80,82,73,78,84,69                          PL
·290 DATA 82,32,63,32,0,76,44,13,234,177,251,2
01,32,240,6,138,113,251,69                         OK
·300 DATA 254,170,138,76,88,12,0,0,0,0,230,251
,208,2,230,252,96,170,177                          FJ
·310 DATA 251,201,34,208,6,165,250,73,255,133,
250,165,250,208,218,177                            GA
·320 DATA 251,201,32,208,212,198,254,76,29,13,
0,169,13,76,98,13,0,0,32                           FI
·330 DATA 170,13,32,226,85,76,180,13,32,170,13
,32,50,142,76,180,13,32                            OF
·340 DATA 170,13,32,210,255,76,180,13,32,170,1
3,32,228,255,76,180,13,32                          AK
·350 DATA 170,13,32,186,255,76,180,13,32,170,1
3,32,189,255                                       BP
·360 DATA 76,180,13,32,170,13,32,192,255,76,18
0,13,32,170,13                                     FP
·370 DATA 32,201,255,76,180,13,32,170,13,32,20
4,255,76,180,13,32,170                             ID
·380 DATA 13,32,195,255,76,180,13,133,67,169,0
,141,0,255,165,67,96                               BJ
·390 DATA 133,67,169,0,141,1,255,165,67,96,0,0
,0                                                 IF
```

FLANKSPEED FOR THE C-64 By GORDON F. WHEAT

Flankspeed will allow you to enter machine language *Ahoy!* programs without any mistakes. Once you have typed the program in, save it for future use. While entering an ML program with *Flankspeed* there is no need to enter spaces or hit the carriage return. This is all done automatically. If you make an error in a line a bell will ring and you will be asked to enter it again. To LOAD in a program Saved with *Flankspeed* use LOAD "name",1,1 for tape, or LOAD "name",8,1 for disk. The function keys may be used after the starting and ending addresses have been entered.

f1 – SAVEs what you have entered so far.
f3 – LOADs in a program worked on previously.
f5 – To continue on a line you stopped on after LOADing in the previous saved work.
f7 – Scans through the program to locate a particular line, or to find out where you stopped the last time you entered the program.
f7 temporarily freezes the output as well.

```
·100 POKE53280,12:POKE53281,11                                LL
·105 PRINT"[CLEAR][c 8][RVSON][15" "]FLANKSPEED[15" "]";      ED
·110 PRINT"[RVSON][5" "]MISTAKEPROOF ML ENTRY PROGRAM[6" "
]"                                                            MC
·115 PRINT"[RVSON][9" "]CREATED BY G. F. WHEAT[9" "]"         DM
·120 PRINT"[RVSON][3" "]COPR. 1984, ION INTERNATIONAL INC.
[3" "]"                                                       DH
·125 FORA=54272TO54296:POKEA,0:NEXT                           IM
·130 POKE54272,4:POKE54273,48:POKE54277,0:POKE54278,249:PO
KE54296,15                                                    NH
·135 FORA=680TO699:READB:POKEA,B:NEXT                         KO
·140 DATA169,251,166,253,164,254,32,216,255,96                HJ
·145 DATA169,0,166,251,164,252,32,213,255,96                  JB
·150 B$="STARTING ADDRESS IN HEX":GOSUB430:AD=B:SR=B          KA
·155 GOSUB480:IFB=0THEN150                                    GN
·160 POKE251,T(4)+T(3)*16:POKE252,T(2)+T(1)*16                KE
·165 B$="ENDING ADDRESS IN HEX":GOSUB430:EN=B                 LO
·170 GOSUB470:IFB=0THEN150                                    EE
·175 POKE254,T(2)+T(1)*16:B=T(4)+1+T(3)*16                    MN
·180 IFB>255THENB=B-255:POKE254,PEEK(254)+1                   GE
·185 POKE253,B:PRINT                                          HN
·190 REM  GET HEX LINE                                        IL
·195 GOSUB495:PRINT": [c P][LEFT]";:FORA=0TO8                 NH
·200 FORB=0TO1:GOTO250                                        MP
·205 NEXTB                                                    ME
·210 A%(A)=T(1)+T(0)*16:IFAD+A-1=ENTHEN340                    LE
·215 PRINT" [c P][LEFT]";                                     IK
·220 NEXTA:T=AD-(INT(AD/256)*256):PRINT" "                    PD
·225 FORA=0TO7:T=T+A%(A):IFT>255THENT=T-255                   LK
·230 NEXT                                                     IA
·235 IFA%(8)<>TTHENGOSUB375:GOTO195                           LE
·240 FORA=0TO7:POKEAD+A,A%(A):NEXT:AD=AD+8:GOTO195            BI
·245 REM    GET HEX INPUT                                     AB
·250 GETA$:IFA$=""THEN250                                     HK
·255 IFA$=CHR$(20)THEN305                                     HF
·260 IFA$=CHR$(133)THEN535                                    KH
·265 IFA$=CHR$(134)THEN560                                    JM
·270 IFA$=CHR$(135)THENPRINT" ":GOTO620                       EG
·275 IFA$=CHR$(136)THENPRINT" ":GOTO635                       AB
·280 IFA$>"@"ANDA$<"G"THENT(B)=ASC(A$)-55:GOTO295             DL
·285 IFA$>"/"ANDA$<":"THENT(B)=ASC(A$)-48:GOTO295             MD
·290 GOSUB415:GOTO250                                         JJ
·295 PRINTA$"[c P][LEFT]";                                    OA
·300 GOTO205                                                  CF
·305 IFA>0THEN320                                             PG
·310 A=-1:IFB=1THEN330                                        OI
·315 GOTO220                                                  BM
·320 IFB=0THENPRINTCHR$(20);CHR$(20);:A=A-1                   HG
·325 A=A-1                                                    BE
·330 PRINTCHR$(20);:GOTO220                                   LK
·335 REM LAST LINE                                            AD
·340 PRINT" ":T=AD-(INT(AD/256)*256)                          GJ
·345 FORB=0TOA-1:T=T+A%(B):IFT>255THENT=T-255                 PL
·350 NEXT                                                     IA
·355 IFA%(A)<>TTHENGOSUB375:GOTO195                           NF
·360 FORB=0TOA-1:POKEAD+B,A%(B):NEXT                          HN
·365 PRINT:PRINT"YOU ARE FINISHED!":GOTO535                   JA
·370 REM BELL AND ERROR MESSAGES                              FL
·375 PRINT:PRINT"LINE ENTERED INCORRECTLY":PRINT:GOTO415      DA
·380 PRINT:PRINT"INPUT A 4 DIGIT HEX VALUE!":GOTO415          FF
·385 PRINT:PRINT"ENDING IS LESS THAN STARTING!":B=0:GOTO41
5                                                             HD
·390 PRINT:PRINT"ADDRESS NOT WITHIN SPECIFIED RANGE!":B=0:
GOTO415                                                       OK
·395 PRINT:PRINT"NOT ZERO PAGE OR ROM!":B=0:GOTO415           FN
·400 PRINT"?ERROR IN SAVE":GOTO415                            PP
·405 PRINT"?ERROR IN LOAD":GOTO415                            PO
·410 PRINT:PRINT:PRINT"END OF ML AREA":PRINT                  PG
·415 POKE54276,17:POKE54276,16:RETURN                         BH
·420 OPEN15,8,15:INPUT#15,A,A$:CLOSE15:PRINTA$:RETURN         IM
·425 REM GET FOUR DIGIT HEX                                   PC
·430 PRINT:PRINTB$;:INPUTT$                                   GM
·435 IFLEN(T$)<>4THENGOSUB380:GOTO430                         NP
·440 FORA=1TO4:A$=MID$(T$,A,1):GOSUB450:IFT(A)=16THENGOSUB
380:GOTO430                                                   FJ
·445 NEXT:B=(T(1)*4096)+(T(2)*256)+(T(3)*16)+T(4):RETURN      GF
·450 IFA$>"@"ANDA$<"G"THENT(A)=ASC(A$)-55:RETURN              EH
·455 IFA$>"/"ANDA$<":"THENT(A)=ASC(A$)-48:RETURN              KP
·460 T(A)=16:RETURN                                           NP
·465 REM ADRESS CHECK                                         LI
·470 IFAD>ENTHEN385                                           LB
·475 IFB<SRORB>ENTHEN390                                      KC
·480 IFB<256OR(B>4096ANDB<49152)ORB>53247THEN395              MG
·485 RETURN                                                   IM
·490 REM ADDRESS TO HEX                                       EB
·495 AC=AD:A=4096:GOSUB520                                    FD
·500 A=256:GOSUB520                                           PE
·505 A=16:GOSUB520                                            MI
·510 A=1:GOSUB520                                             IL
·515 RETURN                                                   IM
·520 T=INT(AC/A):IFT>9THENA$=CHR$(T+55):GOTO530               PE
·525 A$=CHR$(T+48)                                            JP
·530 PRINTA$;:AC=AC-A*T:RETURN                                AC
·535 A$="**SAVE**":GOSUB585                                   LH
·540 OPEN1,T,1,A$:SYS680:CLOSE1                               LH
·545 IFST=0THENEND                                            EO
·550 GOSUB400:IFT=8THENGOSUB420                               CM
·555 GOTO535                                                  CL
·560 A$="**LOAD**":GOSUB585                                   NE
·565 OPEN1,T,0,A$:SYS690:CLOSE1                               MF
·570 IFST=64THEN195                                           LC
·575 GOSUB405:IFT=8THENGOSUB420                               AN
·580 GOTO560                                                  CL
·585 PRINT" ":PRINTTAB(14)A$                                  FG
·590 PRINT:A$="":INPUT"FILENAME";A$                           OM
·595 IFA$=""THEN590                                           DD
·600 PRINT:PRINT"TAPE OR DISK?":PRINT                         DF
·605 GETB$:T=1:IFB$="D"THENT=8:A$="@0:"+A$:RETURN             IG
·610 IFB$<>"T"THEN605                                         BO
·615 RETURN                                                   IM
·620 B$="CONTINUE FROM ADDRESS":GOSUB430:AD=B                 OH
·625 GOSUB475:IFB=0THEN620                                    GH
·630 PRINT:GOTO195                                            PH
·635 B$="BEGIN SCAN AT ADDRESS":GOSUB430:AD=B                 FA
·640 GOSUB475:IFB=0THEN635                                    IB
·645 PRINT:GOTO670                                            PP
·650 FORB=0TO7:AC=PEEK(AD+B):GOSUB505:IFAD+B=ENTHENAD=SR:G
OSUB410:GOTO195                                               NK
·655 PRINT" ";:NEXTB                                          EC
·660 PRINT:AD=AD+8                                            GN
·665 GETB$:IFB$=CHR$(136)THEN195                              LI
·670 GOSUB495:PRINT": ";:GOTO650                              IB
```

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 91 and 92 explain these codes and provide other essential information on entering *Ahoy!* programs. Refer to these pages **before** entering any programs!

LIGHTS OUT!

FROM PAGE 22

```
•4 REM                                          JD
•5 REM LIGHTS OUT!                              HM
•6 REM BY WALTER E. MEYERS                      GB
•7 REM 403 CARRIAGE LANE                        LB
•8 REM CARY, N.C. 27511                         MK
•9 REM                                          JD
•10 GOTO 600                                    CC
•20 POKE 198,0:WAIT 198,1:II=PEEK(631):PO
 KE 198,0:RETURN                                OP
•30 POKE S+5,136:POKE S+6,240:POKE S+1,20
 :POKE S+4,33:RETURN                            CF
•40 POKE SC,11:POKE BO,11:PRINT"[CLEAR]";
 :FOR I=0TO22:PRINT"  [RVSON][BLACK]" M$(
 I):NEXT:RETURN                                 HE
•50 POKE 781,L(R):POKE 782,C(R):POKE 783,
 0:SYS 65520:PRINT LI$(L):LI(R)=L               AO
•60 POKE LC+R,L:RETURN                          GC
•70 FOR CL=S TO S+24:POKE CL,0:NEXT:POKE
 S+24,15:RETURN                                 AA
•80 POKE S+6,240:POKE S+1,40:POKE S+4,17:
 FOR T=1TO3:NEXT:POKE S+4,16:RETURN             OE
•90 POKE 781,LN:POKE 782,CO:POKE 783,0:SY
 S 65520:RETURN                                 CH
•99 :                                           DI
•100 SC=53281:BO=53280:BN=56576:LC=49244:
 V=53248:POKE V+21,0:S=54272:GOSUB 70           CJ
•110 P0=300:FORI=0TO9:READ C(I),L(I),HO(I
 ),VE(I),VS(I):LI(I)=0:NEXT:POKE 785,104        DC
•120 POKE786,192:FORI=1TO5:READ GH(I):NEX
 T:FOR I=0TO7:READ A:POKE 52216+I,A:NEXT        OP
•130 FOR I=39TO46:READ A:POKE V+I,A:NEXT:
 FOR I=4TO16:READ A:POKE V+I,A:NEXT             AA
•140 FOR I=49256TO49275:READ A:POKE I,A:N
 EXT:POKE V+23,1:POKE V+27,2:POKE V+29,0        PM
•150 GS=15:GM=1:POKE V+21,4:GOSUB 500:TM=
 TI                                             LN
•160 K=1:GR(0)=0:GC=1:PR=0:G=0                  CM
•170 N=INT(RND(1)*9+1):GR(K)=N:FOR I=0TOK
 -1:IF GR(K)=GR(I)THEN 170                      JA
•180 NEXT:K=K+1:IF K<10 THEN 170                HE
•190 POKE V,HO(PR):POKE V+1,VE(PR):POKE V
 +16,VS(PR):POKE LC,1:POKE V+21,5               OK
•199 :                                          DI
•200 JOY=PEEK(56320)AND15:FIRE=PEEK(56320
 )AND16                                         BA
•210 IF JOY=11 THEN IF PR<>3ANDPR<>6ANDPR
 <>9 THEN PR=PR+1:POKE 52216,4:GOTO 260         OI
•220 IF JOY=14 THEN IF PR<7 THEN PR=PR+3:
 GOTO 260                                       NP
•230 IF JOY=13 THEN IF PR>3 THEN PR=PR-3:
 GOTO 260                                       OD
•240 IF JOY=7 THEN IF PR<>7ANDPR<>4ANDPR<
 >1 THEN PR=PR-1:POKE 52216,3:GOTO 260          LN
•250 IF FIRE=0 THEN IF PR>0 THEN R=PR:L=1
 :GOSUB 50:GOSUB 80                             ND
•260 WIN=USR(0):IF WIN=1 THEN POKE V+21,5
 :GOTO 400                                      AA
•270 GOSUB 300:FOR T=1TO40:NEXT:POKE V,HO
 (PR):POKE V+1,VE(PR):POKE V+16,VS(PR)          CP
•280 GOTO 200                                   BO
•299 :                                          DI
•300 GC=GC+1:IF GC<GS THEN RETURN               IH
•310 GC=1:G=G+1:IF G=10 THEN G=1                LJ
•320 POKE V+2,HO(GR(G)):POKE V+3,VE(GR(G)
 )+14:POKE V+21,7:R=GR(G)                       MP
•330 L=0:GOSUB 50:GOSUB 30:RETURN               GO
•399 :                                          DI
•400 GM=GM+1:IF GM>5 THEN 430                   IC
•410 GS=GS-2:POKE V+40,GH(GM):POKE SC,GH(
 GM):POKE BO,GH(GM):FOR I=1TO10:NEXT            HK
•420 POKE SC,11:POKE BO,11:L=0:FOR R=1TO9
 :GOSUB 50:NEXT:GOTO 160                        CN
•429 :                                          DI
•430 P1=(TI-TM)/60:P2=INT(P1/60):P3=INT(P
 1-(P2*60)):LN=21:CO=5:GOSUB 90                 FK
•440 POKE 52216,5:PRINT"[WHITE]YOUR TIME:
 " P2 "MIN.," P3 "SEC.":IF P1<P0 THEN P0=
 P1                                             JL
•450 B2=INT(P0/60):B3=INT(P0-(B2*60)):LN=
 22:CO=5:GOSUB 90:PRINT"[WHITE]BEST TIME:
 ";                                             PK
•460 PRINT B2 "MIN.," B3 "SEC.":LN=23:CO=
 2:GOSUB 90:PRINT"HIT Q TO QUIT, ";             MI
•470 PRINT"ANY OTHER KEY TO PLAY.":GOSUB
 20:POKE V+21,0:IF II=81 THEN 490               BB
•480 GOTO 150                                   CG
•490 POKE 648,4:POKE 53272,21:POKE BN,199
 :POKE SC,6:POKE BO,14:PRINT"[CLEAR][c 7]
 ":END                                          LA
•499 :                                          DI
•500 PRINT"[CLEAR]":POKE BN,PEEK(BN)AND 2
 52:POKE 648,200:GOSUB 40:POKE V+24,44          KK
•510 FOR T=1TO2000:NEXT:R=9:L=0:POKE S+5,
 6:POKE S+6,255:POKE S+4,23:VO=15               HE
•520 FORK=1TO5:F1=20:POKE S+24,2:F1=20:PO
 KE S+24,2:FOR J=1TO6:POKE S+24,VO:F2=20        LG
•530 POKE S+1,F1:FOR I=1TO4:POKE S+15,F2:
 F2=F2*1.02:NEXT:F1=F1*1.2:VO=VO-2:NEXT         MB
•540 GOSUB 50:POKE V+21,6:POKE V+2,HO(R):
 POKE V+3,VE(R)+14:R=R-1:POKE S+24,15           AJ
•550 FOR J=1TO8:F2=20:POKE S+1,F1:FOR I=1
 TO3:POKE S+15,F2:F2=F2/1.2:NEXT                BJ
•570 F1=F1/1.5:NEXT:VO=15:IF R>0THENGOSUB
 50:POKEV+2,HO(R):POKEV+3,VE(R)+14:R=R-1        MH
•580 NEXT:POKE S+6,15:GOSUB 70:POKE V+21,
 254:FOR K=1TO30:FOR J=6TO14STEP2               AM
```

```
•590 POKE V+J,INT(RND(1)*(255-40)+40):POK
E V+J+1,INT(RND(1)*(200-50)+50)           FI
•595 NEXT:NEXT:POKE V+21,4:POKE 52216,4:R
ETURN                                     MN
•600 POKE 53281,15:PRINT"[CLEAR][5"[DOWN]
"][BLACK] INSERT A JOYSTICK IN PORT TWO.
 HIT ANY "                                CN
•610 PRINTTAB(12)"KEY WHEN READY.":GOSUB
20                                        GL
•620 J=56334:FOR I=49152TO49184:READ A:PO
KE I,A:NEXT:POKE J,PEEK(J)AND 254         GM
•630 POKE 1,PEEK(1)AND 251:SYS 49152:POKE
 1,PEEK(1)OR 4:POKE J,PEEK(J)OR 1         HF
•640 READ A:IF A=-1 THEN 660              MO
•650 FOR I=0TO7:READ B:POKE 61440+A*8+I,B
:NEXT:GOTO 640                            AM
•660 FOR I=0TO319:READ A:POKE 49344+I,A:N
EXT                                       BD
•699 :                                    DI
•700 DIM M$(23),IN$(4):M$(0)="[BLUE][LEFT
][][][][][][][][][][][][][][][]":M$(2)=M
$(0)                                      DB
•710 M$(1)="[BLUE][LEFT]][][][][][][][][]
[][][][][][][["                           MJ
•720 M$(3)="[BLACK][s I][s J][s A][s B][s
 C][s D][s E][s F][3"[s J]"][s A][s B][s
 C][s D][s E][s F][3"[s J]"][s A][s B][s
 C][s D][s E][s F][s J][s K]"             PM
•730 M$(4)="[s I][s J][s G][YELLOW] [c I]
   [BLACK][s H][3"[s J]"][s G][YELLOW] [c
 D][c F] [BLACK][s H][3"[s J]"][s G][YEL
LOW][c D][c I][c I][c F][BLACK][s H][s J
][s K]"                                   JM
•740 M$(5)="[s I][s J][s G][YELLOW] @  [B
LACK][s H][3"[s J]"][s G][YELLOW] [RVSOF
F][c K][RVSON][c K] [BLACK][s H][3"[s J]
"][s G][YELLOW][RVSOFF][c K][RVSON][c K]
[c C][c V][BLACK][s H][s J][s K]"         PF
•750 M$(6)="[s I][s J][s G][YELLOW] @  [B
LACK][s H][3"[s J]"][s G][YELLOW] [RVSOF
F][c K][RVSON][c K] [BLACK][s H][3"[s J]
"][s G][YELLOW][RVSOFF][c K][RVSON][c K]
[RVSOFF][c F][RVSON][c K][BLACK][s H][s
J][s K]"                                  LI
•760 M$(7)="[s I][s J][s G][YELLOW] [RVSO
FF][c I][c I][RVSON] [BLACK][s H][3"[s J
]"][s G][YELLOW] [c C][c V] [BLACK][s H]
[3"[s J]"][s G][YELLOW][c C][RVSOFF][c I
][c I][RVSON][c V][BLACK][s H][s J][s K]
"                                         GC
•770 M$(8)="[s I][s J][s P][4"[s Q]"][s R
][s I][s J][s K][s P][4"[s Q]"][s R][s I
][s J][s K][s P][4"[s Q]"][s R][s J][s K
]":M$(9)=M$(3)                            IH
•780 M$(10)="[s I][s J][s G][YELLOW][c D]
[c F][c D][c F][BLACK][s H][3"[s J]"][s
G][YELLOW][c D][c I][c I][c F][BLACK][s
H][3"[s J]"][s G][YELLOW][c D][c I][c I]
[c F][BLACK][s H][s J][s K]"              BB
•790 M$(11)="[s I][s J][s G][YELLOW][RVSO
FF][c K][c C][c V][RVSON][c K][BLACK][s
H][3"[s J]"][s G][YELLOW] [RVSOFF][c K][
RVSON][c K] [BLACK][s H][3"[s J]"][s G][
YELLOW][RVSOFF][c K][c C][RVSON][c I][c
F][BLACK][s H][s J][s K]"                 FO
•800 M$(12)="[s I][s J][s G][YELLOW][RVSO
FF][c K][RVSON][c K][RVSOFF][c K][RVSON]
[c K][BLACK][s H][3"[s J]"][s G][YELLOW]
 [RVSOFF][c K][RVSON][c K] [BLACK][s H][
3"[s J]"][s G][YELLOW]  [RVSOFF][c K][RV
SON][c K][BLACK][s H][s J][s K]"          OD
•810 M$(13)="[s I][s J][s G][YELLOW][c C]
[c V][c C][c V][BLACK][s H][3"[s J]"][s
G][YELLOW] [c C][c V] [BLACK][s H][3"[s
J]"][s G][YELLOW][c C][RVSOFF][c I][c I]
[RVSON][c V][BLACK][s H][s J][s K]"       AI
•820 M$(14)="[s I][s J][s P][4"[s Q]"][s
R][s I][s J][s K][s P][4"[s Q]"][s R][s
I][s J][s K][s P][4"[s Q]"][s R][s J][s
K][BLUE][][][][]"                         JH
•830 M$(15)="[BLACK][s I][s J][s A][s B][
s C][s D][s E][s F][3"[s J]"][s A][s B][
s C][s D][s E][s F][3"[s J]"][s A][s B][
s C][s D][s E][s F][s J][s K][BLUE]][][]
[]["                                      FG
•840 M$(16)="[s I][s J][s G][YELLOW][c D]
[c I][c I][c F][BLACK][s H][3"[s J]"][s
G][YELLOW][c D][c F][c D][c F][BLACK][s
H][3"[s J]"][s G][YELLOW][c D][c I][c I]
[c F][BLACK][s H][s J][s K][s U][s V][RV
SOFF]  [RVSON][s W][s X][s H]"            BC
•850 M$(17)="[s I][s J][s G][YELLOW][RVSO
FF][c K][RVSON][c K][RVSOFF][c K][RVSON]
[c K][BLACK][s H][3"[s J]"][s G][YELLOW]
[RVSOFF][c K][RVSON][c K][RVSOFF][c K][R
VSON][c K][BLACK][s H][3"[s J]"][s G][YE
LLOW] [RVSOFF][c K][RVSON][c K] [BLACK][
s H][s J][s K][RVSOFF][6" "][RVSON][s H]
"                                         HP
•860 M$(18)=M$(17):M$(19)="[s I][s J][s G
][YELLOW][c C][RVSOFF][c I][c I][RVSON][
c V][BLACK][s H][3"[s J]"][s G][YELLOW][
c C][RVSOFF][c I][c I][RVSON][c V][BLACK
][s H][3"[s J]"][s G][YELLOW] [c C][c V]
 [BLACK][s H][s J][s K][RVSOFF][6" "][RV
SON][s H]"                                ML
•870 M$(20)=M$(8)+"[6"[s S]"][s H]":M$(21
)="[s I][26"[s J]"][s K][6"[s T]"][s H]"  GO
•880 M$(22)="[s I][26"[s J]"][s K]"+"[7"
"][c U]"                                  OG
•890 L$="[][][DOWN][4"[LEFT]"]<><>[DOWN][
4"[LEFT]"][][][DOWN][4"[LEFT]"]<><>":LI$
(0)="[RVSOFF][BLACK]"+L$:LI$(1)="[RVSON]
[YELLOW]"+L$:GOTO100                      LD
•899 :                                    DI
•900 DATA 169,0,133,251,133,253,169,208,1
```

```
33,252,169,240,133,254,162,16,160          KK
•901 DATA 0,177,251,145,253,136,208,249,2
30,252,230,254,202,208,240,96              CG
•907 :                                     DI
•1000 DATA 0,255,255,255,255,255,255,255,
255                                        MH
•1001 DATA 27,255,128,128,128,128,128,128
,128                                       EG
•1002 DATA 29,255,1,1,1,1,1,1,1            MN
•1003 DATA 60,128,128,128,128,128,128,128
,128                                       LA
•1004 DATA 62,1,1,1,1,1,1,1,1              KG
•1005 DATA 128,0,0,0,0,0,0,0,0             EF
•1006 DATA 155,0,127,127,127,127,127,127,
127                                        HC
•1007 DATA 157,0,254,254,254,254,254,254,
254                                        CF
•1008 DATA 158,255,231,195,129,231,231,23
1,103                                      ML
•1009 DATA 188,127,127,127,127,127,127,12
7,127                                      IH
•1010 DATA 190,254,254,254,254,254,254,25
4,254                                      IE
•1011 DATA 193,0,255,14,240,199,159,62,0   GP
•1012 DATA 194,15,240,7,254,252,0,127,0    LO
•1013 DATA 195,128,60,249,3,243,121,28,0   JK
•1014 DATA 196,1,60,159,192,207,158,56,0   EJ
•1015 DATA 197,240,15,224,127,63,0,254,0   OA
•1016 DATA 198,0,255,112,15,227,249,124,0  DL
•1017 DATA 199,140,206,134,150,146,154,15
2,156                                      CP
•1018 DATA 200,49,115,97,105,73,89,25,57   HL
•1019 DATA 201,0,127,0,255,255,255,255,25
5                                          JJ
•1020 DATA 202,0,255,0,255,255,255,255,25
5                                          IK
•1021 DATA 203,0,254,0,255,255,255,255,25
5                                          HI
•1022 DATA 208,0,63,159,192,255,255,255,2
55                                         AB
•1023 DATA 209,0,255,255,0,255,255,255,25
5                                          OH
•1024 DATA 210,0,252,249,3,255,255,255,25
5                                          OA
•1025 DATA 211,255,255,255,60,60,24,60,60  MM
•1026 DATA 212,126,126,126,60,60,24,60,25
5                                          PE
•1027 DATA 213,255,135,156,176,224,240,24
0,224                                      DJ
•1028 DATA 214,254,128,0,0,0,0,0,0         PP
•1029 DATA 215,127,1,0,0,0,0,0,0           DA
•1030 DATA 216,255,225,57,13,7,15,15,7     GO
•1031 DATA -1                              OE
•1099 :                                    DI
•1100 DATA 0,0,0,0,0,0,0,0,0               JH
•1101 DATA 0,0,0,0,0,0,0,0,0               JH
•1102 DATA 0,0,0,0,0,0,0,0,0               JH
•1103 DATA 0,0,0,1,255,192,3,255,224       CB
•1104 DATA 3,255,240,1,255,192,1,254,0     DI
•1105 DATA 7,255,192,15,255,224,15,255,24
0                                          FN
•1106 DATA 15,255,240,7,255,240,3,255,224
,0                                         LJ
•1109 :                                    DI
•1110 DATA 0,0,0,0,0,0,0,0,0               JH
•1111 DATA 0,0,0,0,0,0,0,0,0               JH
•1112 DATA 0,0,0,0,0,0,0,0,0               JH
•1113 DATA 0,0,0,3,255,128,7,255,192       EM
•1114 DATA 15,255,192,3,255,128,0,127,128  MN
•1115 DATA 3,255,224,7,255,240,15,255,240  BI
•1116 DATA 15,255,240,15,255,224,7,255,19
2,0                                        AC
•1119 :                                    DI
•1120 DATA 0,0,0,0,0,0,0,0,0               JH
•1121 DATA 0,0,0,0,0,0,0,254,0             PP
•1122 DATA 1,255,0,15,165,240,62,0,124     CK
•1123 DATA 120,0,30,248,255,31,249,255,15
9                                          GO
•1124 DATA 253,255,191,124,255,62,62,126,
124                                        FL
•1125 DATA 63,255,252,31,255,248,15,255,2
40                                         MP
•1126 DATA 15,255,240,15,255,240,7,255,22
4,0                                        GI
•1129 :                                    DI
•1130 DATA 0,126,0,1,255,128,7,255,224     MA
•1131 DATA 15,255,240,28,24,56,30,24,120   KK
•1132 DATA 31,153,248,25,255,152,28,126,5
6                                          FC
•1133 DATA 30,0,120,31,0,248,15,129,240    GL
•1134 DATA 15,231,240,7,255,224,7,255,224  PE
•1135 DATA 3,255,192,3,255,192,1,255,128   DH
•1136 DATA 0,255,0,0,126,0,0,24,0,0        AG
•1139 :                                    DI
•1140 DATA 1,255,128,7,255,224,31,255,248  HN
•1141 DATA 63,255,252,127,255,254,127,255
,254                                       HG
•1142 DATA 255,255,255,255,255,255,255,25
5,255                                      NI
•1143 DATA 255,255,255,255,255,255,127,25
5,254                                      ND
•1144 DATA 127,255,254,63,255,252,31,255,
248                                        EO
•1145 DATA 7,255,224,1,255,128,0,0,0       LK
•1146 DATA 0,0,0,0,0,0,0,0,0,0             NC
•1199 :                                    DI
•1200 DATA 30,16,16,169,5, 23,16,213,169,
4, 14,16,140,169,4, 5,16,67,169,4          PF
•1201 DATA 23,10,213,121,4, 14,10,140,121
,4, 5,10,67,121,4, 23,4,213,73,4           LD
•1202 DATA 14,4,140,73,4, 5,4,67,73,4      FL
•1209 :                                    DI
•1210 DATA 3,10,13,14,1,6,6,7,6,6,6,6,6,0
,3,15,8,10,14,13,7                         NC
•1219 :                                    DI
•1220 DATA 60,65,12,65,60,60,140,121,140,
```

```
 121,140,121,4                              HI
·1229 :                                     DI
·1230 DATA 160,0,185,93,192,240,12,200,19
 2,9,208,246,160,1,169,0,108,5,0,96         DP
·4999 :                                     DI
·5000 CC=0:FOR I=49152TO49184:READ A:CC=C
 C+A:NEXT                                   FD
·5010 IF CC<>5966 THEN PRINT"ERROR IN LIN
 ES 900-901":STOP                           PG
·5020 PRINT"FONT LOADER OK":CC=0            FP
·5030 READ A:CC=CC+A:IF A=-1 THEN 5050      HA
·5040 GOTO 5030                             GD
·5050 IF CC<>37856 THEN PRINT"ERROR IN LI
 NES 1[3"0"]-1031":STOP                     GL
·5060 PRINT"CHARACTER DATA OK":FOR I=0TO4
 :CC(I)=0:NEXT                              FG
·5070 CS(0)=5083:CS(1)=4895:CS(2)=7035:CS
 (3)=6822:CS(4)=10317                       LJ
·5080 FOR J=0TO4:FOR I=0TO63                GG
·5090 READ A:CC(J)=CC(J)+A:NEXT             KF
·5100 NEXT:FOR I=0TO4                       DP
·5110 IF CC(I)<>CS(I) THEN PRINT"ERROR IN
  LINES"1100+I*10"TO"1106+I*10:STOP         HN
·5120 PRINT"SPRITE"I+1"OK"                  LJ
·5130 NEXT:CC=0                             CG
·5140 FOR I=1TO104                          OP
·5150 READ A:CC=CC+A                        LF
·5160 NEXT:IF CC<>6382 THEN PRINT"ERROR I
 N LINES 1200-1230":STOP                    OJ
·5170 PRINT"ALL DATA OK"                    KI
```

WIZARD TAG

FROM PAGE 31

Starting address in hex: C000
Ending address in hex: CC87
SYS to start: 49152

***Flankspeed* required for entry! See page 93.**

```
C000: 4C 67 C5 EA EA EA AD 00 E7
C008: DC C9 77 D0 03 4C 26 C0 2D
C010: C9 7B D0 03 4C 6D C0 C9 6D
C018: 7D D0 03 4C B4 C0 C9 7E 73
C020: D0 03 4C 2B C1 60 EE 54 D0
C028: C3 AD 54 C3 C9 05 F0 1F 90
C030: A2 00 A5 FC DD 4A C3 F0 52
C038: 06 E8 E0 06 D0 F4 60 A5 D9
C040: FB C9 FE F0 F9 E6 FB E6 B9
C048: FB A5 FB 8D 00 D0 60 A9 4E
C050: 00 8D 54 C3 AD 51 C3 C9 82
C058: C2 F0 0C CE 51 C3 AD 51 FA
C060: C3 8D F8 07 4C 30 C0 EE DD
C068: 51 C3 4C 5E C0 EE 54 C3 EF
C070: AD 54 C3 C9 05 F0 1F A2 B7
C078: 00 A5 FC DD 4A C3 F0 06 FD
C080: E8 E0 06 D0 F4 60 A5 FB 18
C088: C9 12 F0 F9 C6 FB C6 FB D4
C090: A5 FB 8D 00 D0 60 A9 00 9A
C098: 8D 54 C3 AD 52 C3 C9 C0 8C
C0A0: F0 0C CE 52 C3 AD 52 C3 46
C0A8: 8D F8 07 4C 77 C0 EE 52 FB
C0B0: C3 4C A5 C0 EE 54 C3 AD DB
C0B8: 54 C3 C9 05 D0 03 20 09 9C
C0C0: CB A5 FC C9 3C B0 01 60 47
C0C8: C9 5D B0 03 4C 0D C1 C9 88
C0D0: 7D B0 03 4C EC C0 C9 9D 63
C0D8: B0 03 4C 0D C1 C9 BD B0 DF
C0E0: 03 4C EC C0 C9 DD B0 03 39
C0E8: 4C 0D C1 60 A5 FB C9 3B 0B
C0F0: B0 01 60 A5 FB C9 47 B0 66
C0F8: 03 4C 1C C1 A5 FB C9 CB 5D
C100: B0 01 60 A5 FB C9 D7 B0 06
C108: 03 4C 1C C1 60 A5 FB C9 01
C110: 83 B0 01 60 C9 8F B0 03 B2
C118: 4C 1C C1 60 A5 FC C9 DD EC
C120: D0 01 60 E6 FC A5 FC 8D 66
C128: 01 D0 60 EE 54 C3 AD 54 63
C130: C3 C9 05 D0 03 20 09 CB 8B
C138: A5 FC C9 DE 90 01 60 C9 3F
C140: BE 90 03 4C 7E C1 C9 9E 87
C148: 90 03 4C 63 C1 C9 7E 90 26
C150: 03 4C 7E C1 C9 5E 90 03 9B
C158: 4C 63 C1 C9 3E 90 03 4C B1
C160: 7E C1 60 A5 FB C9 3B B0 58
C168: 01 60 C9 47 B0 03 4C 8D 68
C170: C1 C9 CB B0 01 60 C9 D7 7B
C178: B0 03 4C 8D C1 60 A5 FB C9
C180: C9 83 B0 01 60 C9 8F B0 E9
C188: 03 4C 8D C1 60 A5 FC C9 F3
C190: 3D D0 01 60 C6 FC A5 FC 66
C198: 8D 01 D0 60 A9 EE 36 C3 EA
C1A0: AD 36 C3 C9 08 D0 21 A9 B5
C1A8: 00 8D 36 C3 AD 37 C3 C9 A2
C1B0: C6 F0 06 CE 37 C3 4C BC 41
C1B8: C1 EE 37 C3 AD 37 C3 8D 9A
C1C0: F9 07 8D FA 07 8D FB 07 E1
C1C8: 60 00 AD 1E D0 C9 00 F0 80
C1D0: 3A 8D 50 C3 A2 00 BD 38 45
C1D8: C3 CD 50 C3 F0 24 E8 E0 5D
C1E0: 0F D0 F3 A2 00 BD 47 C3 20
C1E8: CD 50 C3 F0 18 E8 E0 03 A0
C1F0: D0 F3 AD 50 C3 C9 81 F0 B3
C1F8: 0F A9 00 8D 1E D0 8D 50 0C
C200: C3 60 4C 0E C4 4C D8 C2 2B
C208: 4C CC C4 60 00 00 00 00 46
C210: AD 1B D4 C9 E6 90 28 AD C4
C218: 32 C3 C9 02 F0 12 CE 02 AD
C220: D0 AD 02 D0 C9 18 D0 05 29
C228: A9 02 8D 32 C3 4C 3F C2 A5
C230: EE 02 D0 AD 02 D0 C9 E0 1D
C238: D0 05 A9 01 8D 32 C3 AD E9
C240: 1B D4 C9 C8 90 28 AD 33 5C
C248: C3 C9 02 F0 12 CE 04 D0 7E
C250: AD 04 D0 C9 18 D0 05 A9 34
C258: 02 8D 33 C3 4C 6E C2 EE 4B
C260: 04 D0 AD 04 D0 C9 E0 D0 33
C268: 05 A9 01 8D 33 C3 AD 1B 65
```

```
C270: D4 C9 C8 90 28 AD 34 C3 36
C278: C9 02 F0 12 CE 06 D0 AD 9A
C280: 06 D0 C9 18 D0 05 A9 02 BA
C288: 8D 34 C3 4C 9D C2 EE 06 AF
C290: D0 AD 06 D0 C9 E0 D0 05 66
C298: A9 01 8D 34 C3 60 00 00 29
C2A0: 00 A9 3D 8D 09 D0 20 CE DD
C2A8: C2 8D 08 D0 A0 00 AD 1B 3B
C2B0: D4 C9 05 B0 F9 AA BD 4B B2
C2B8: C3 99 0B D0 20 CE C2 99 3D
C2C0: 0A D0 C8 C8 C0 06 D0 E6 AB
C2C8: AD 1E D0 D0 DF 60 AD 1B 3F
C2D0: D4 C9 14 90 F9 60 00 00 6E
C2D8: AD 50 C3 C9 11 D0 0F 38 8D
C2E0: AD 15 D0 E9 10 8D 15 D0 E1
C2E8: EE 35 C3 4C C8 C3 C9 21 94
C2F0: D0 0C 38 AD 15 D0 E9 20 A3
C2F8: 8D 15 D0 4C E8 C2 C9 41 6F
C300: D0 0C 38 AD 15 D0 E9 40 D2
C308: 8D 15 D0 4C E8 C2 60 A2 76
C310: 00 BD 9B C8 9D 00 D4 E8 8D
C318: E0 19 D0 F5 60 05 01 00 3F
C320: 82 AD 1E FE DD E0 3A 18 7E
C328: 7A E0 BA 6B 40 73 6D 40 0B
C330: 7D 00 01 02 01 00 04 C6 7C
C338: 03 05 09 13 15 19 23 25 D2
C340: 29 43 45 49 83 85 89 11 DE
C348: 21 41 3D 5D 7D 9D BD DD FB
C350: 00 C3 C1 C5 03 74 7A 23 B0
C358: FB 00 CE 1E C3 AD 1E C3 94
C360: D0 29 A9 00 8D 04 D4 A9 14
C368: 11 8D 0B D4 A9 01 8D 1E 3D
C370: C3 CE 20 C3 AD 20 C3 D0 49
C378: 12 EE 1F C3 AE 1F C3 E0 CE
C380: 60 D0 18 A9 01 8D 20 C3 E5
C388: 8D 1F C3 A9 00 8D 1D C3 11
C390: EE 1D C3 AD 1D C3 C9 05 BD
C398: D0 F6 60 A9 00 8D 04 D4 D0
C3A0: A9 11 8D 0B D4 BD B4 C8 04
C3A8: 8D 00 D4 8D 07 D4 BD 18 4A
C3B0: C9 8D 01 D4 8D 08 D4 A9 F1
C3B8: 14 8D 1E C3 18 6D 1E C3 A3
C3C0: 8D 20 C3 4C 8B C3 00 00 CD
C3C8: A9 00 8D 57 C3 AD B8 C3 45
C3D0: 8D 79 CB A9 06 8D B8 C3 5D
C3D8: 20 F4 CA 20 9D C1 20 5A B2
C3E0: C3 EE 57 C3 AD 57 C3 C9 41
C3E8: 23 D0 ED AD 35 C3 C9 03 3E
C3F0: D0 0A A9 8F 8D 15 D0 A9 22
C3F8: 00 8D 35 C3 A9 00 8D 1E D4
C400: D0 8D 50 C3 AD 79 CB 8D F2
C408: B8 C3 60 CA 00 00 A2 00 52
C410: BD 38 C3 CD 50 C3 F0 29 C5
C418: E8 E8 E8 E0 0F D0 F1 A2 28
C420: 00 BD 39 C3 CD 50 C3 F0 AD
C428: 30 E8 E8 E8 E0 0F D0 F1 C5
C430: A2 00 BD 3A C3 CD 50 C3 70
C438: F0 37 E8 E8 E8 E0 0F D0 DB
C440: F1 AD 03 D0 8D 56 C3 18 73
C448: AD 02 D0 69 0C 8D 55 C3 E4
C450: AD 28 D0 8D 27 D0 4C 86 4F
C458: C4 AD 05 D0 8D 56 C3 18 60
C460: AD 04 D0 69 0C 8D 55 C3 FE
C468: AD 29 D0 8D 27 D0 4C 86 68
C470: C4 AD 07 D0 8D 56 C3 18 7A
C478: AD 06 D0 69 0C 8D 55 C3 19
C480: AD 2A D0 8D 27 D0 A9 C0 19
C488: 8D F8 07 20 29 C5 20 9D E2
C490: C1 AD 00 D0 CD 55 C3 B0 68
C498: 06 EE 00 D0 4C A2 C4 CE E0
C4A0: 00 D0 AD 01 D0 CD 56 C3 D8
C4A8: B0 06 EE 01 D0 4C B3 C4 E4
C4B0: CE 01 D0 EE F8 07 AD F8 E6
C4B8: 07 C9 C5 D0 05 A9 C0 8D 1D
C4C0: F8 07 AD 59 C3 F0 C4 60 A1
C4C8: 00 00 00 00 A9 21 8D 63 84
C4D0: C3 A9 20 8D 9C C3 AD B8 B2
C4D8: C3 8D 79 CB A9 06 8D B8 65
C4E0: C3 20 F4 CA 20 9D C1 20 24
C4E8: 5A C3 EE 57 C3 AD 57 C3 D9
C4F0: C9 00 D0 ED A9 7F 8D 15 45
C4F8: D0 AD 79 CB 8D B8 C3 A9 70
C500: 00 8D 63 C3 8D 9C C3 8D 30
C508: 50 C3 8D 1E D0 20 0F C3 8B
C510: 20 A1 C2 CE B8 C3 EE 7B 4A
C518: C9 A9 01 8D 05 C9 AD 1E B4
C520: D0 D0 DC 20 65 CC 60 04 55
C528: 00 A9 09 8D 07 D4 AD 1B 0D
C530: D4 8D 08 D4 A9 81 8D 0B 33
C538: D4 20 F4 CA A9 80 8D 0B AF
C540: D4 EE 28 C5 AD 28 C5 C9 57
C548: 00 D0 08 EE 59 C3 A9 00 D6
C550: 8D 28 C5 60 C5 AD 31 C5 96
C558: C9 64 D0 08 EE 59 C3 A9 15
C560: 00 8D 31 C5 60 00 FB A9 EA
C568: 93 20 D2 FF EA EA EA EA 9A
C570: 20 7C C9 A2 00 BD 1B C6 19
C578: 9D 00 30 E8 E0 00 D0 F5 D6
C580: A2 00 BD 1B C7 9D 00 31 92
C588: E8 E0 00 D0 F5 A2 00 BD 79
C590: 1B C8 9D 00 32 E8 E0 80 8E
C598: D0 F5 A2 00 BD 23 C3 9D 44
C5A0: 00 D0 BD F3 C5 9D F8 07 86
C5A8: E8 E0 08 D0 EF A2 00 BD 9B
C5B0: FB C5 9D 10 D0 E8 E0 1F D9
C5B8: D0 F5 A2 00 A9 A0 9D 00 0A
C5C0: 04 9D A0 04 9D 40 05 9D 87
C5C8: E0 05 9D 80 06 9D 20 07 97
C5D0: 9D C0 07 A9 00 9D 00 D8 56
C5D8: 9D A0 D8 9D 40 D9 9D E0 26
C5E0: D9 9D 80 DA 9D 20 DB 9D EA
C5E8: C0 DB E8 E0 20 D0 CD 4C 5A
C5F0: 95 C9 00 C0 C6 C6 C6 C8 2E
C5F8: C8 C8 C9 00 1B 2F 22 82 43
C600: 7F C8 00 15 78 F0 00 81 48
C608: 0E 00 00 0B 09 F1 F2 F3 03
```

```
C610: 0A 00 06 0D 04 0E 01 01 41
C618: 01 0D 61 00 00 00 00 00 87
C620: 00 00 0C 00 00 3F 00 00 6B
C628: 33 00 00 14 00 00 04 00 73
C630: 00 04 00 00 2A 00 00 2A 88
C638: 00 00 2A 00 00 2A 00 00 8C
C640: 2A 00 00 2E 00 00 14 00 AC
C648: 00 44 00 00 44 00 00 41 12
C650: 00 00 40 40 00 C0 C0 03 55
C658: C3 C0 00 00 00 00 00 00 DC
C660: 00 00 30 00 00 FC 00 00 8D
C668: CC 00 00 50 00 00 10 00 95
C670: 00 10 00 00 28 00 00 2A D2
C678: 00 00 2A 00 00 2A 00 00 CC
C680: 28 00 00 2C 00 00 14 00 E8
C688: 00 14 00 00 14 00 00 14 C4
C690: 00 00 15 00 00 33 00 00 D8
C698: CC 00 00 00 00 00 00 00 65
C6A0: 00 00 30 00 00 FC 00 00 CD
C6A8: CC 00 00 50 00 00 40 00 06
C6B0: 00 40 00 00 A0 00 02 A0 34
C6B8: 00 02 A0 00 02 A0 00 02 FF
C6C0: A0 00 03 A0 00 00 50 00 55
C6C8: 00 44 00 00 44 00 01 01 53
C6D0: 00 01 01 00 03 03 00 03 DB
C6D8: C3 C0 00 00 00 00 00 00 5D
C6E0: 00 00 0C 00 00 3F 00 00 2C
C6E8: 33 00 00 14 00 00 10 00 40
C6F0: 00 10 00 00 A0 00 00 A0 42
C6F8: 00 00 A0 00 00 A0 00 00 3A
C700: A0 00 00 B0 00 00 50 00 A1
C708: 00 50 00 00 50 00 00 44 EC
C710: 00 00 84 00 00 CC 00 00 61
C718: 33 00 00 00 00 00 00 00 4B
C720: 00 00 30 00 00 FC 00 00 4D
C728: CC 00 00 10 00 00 10 00 15
C730: 00 10 00 00 A8 00 00 A8 91
C738: 00 00 A8 00 00 AB 00 00 8C
C740: A8 00 00 A8 00 00 54 00 E5
C748: 00 44 00 00 44 00 00 44 15
C750: 00 00 4C 00 00 C0 00 00 5D
C758: C0 00 00 00 00 00 00 00 19
C760: 00 00 00 00 00 30 00 00 90
C768: FC 00 00 FC 00 00 10 00 72
C770: 00 10 00 00 A8 00 00 AB D4
C778: 00 00 A8 00 00 A8 00 00 C9
C780: A8 00 00 A8 00 00 54 00 26
C788: 00 44 00 00 44 00 00 44 55
C790: 00 00 C4 00 00 0C 00 00 61
C798: 0C 00 00 7F FF FF 2A AA F8
C7A0: AA 42 42 42 42 42 42 42 1B
C7A8: 42 42 24 24 24 24 24 24 06
C7B0: 42 42 42 42 42 42 42 42 C2
C7B8: 42 42 42 42 24 24 24 24 52
C7C0: 24 24 42 42 42 E7 77 77 A6
C7C8: 00 00 00 00 00 00 00 00 C8
C7D0: 00 00 00 00 00 00 00 00 D0
C7D8: 00 00 00 7F FF FF 55 55 03
C7E0: 55 24 24 24 24 24 24 24 33
C7E8: 24 24 42 42 42 42 42 42 BE
C7F0: 24 24 24 24 24 24 24 24 12
C7F8: 24 24 24 24 42 42 42 42 92
C800: 42 42 24 24 24 3C 3C 3C A5
C808: 00 00 00 00 00 00 00 00 08
C810: 00 00 00 00 00 00 00 00 10
C818: 00 00 00 00 00 00 00 00 18
C820: 00 00 00 00 00 00 00 00 20
C828: 00 00 00 00 00 00 00 00 28
C830: 00 00 00 00 00 00 00 00 30
C838: 00 00 00 00 00 00 00 00 38
C840: 00 00 00 00 00 00 00 00 40
C848: FC 00 00 CC 00 00 C7 FF D9
C850: FE CC 06 AA FC 07 0A 00 DA
C858: 02 0A 00 00 00 00 00 00 64
C860: 00 02 AA 80 0A AA A0 0A EC
C868: AA A0 0A 55 A0 0A AA A0 09
C870: 0A AA A0 09 55 60 05 D7 61
C878: 50 05 55 50 05 55 50 07 25
C880: D7 D0 0D 55 70 31 69 4C E2
C888: 33 55 CC 30 FF 0C 30 FF 4A
C890: 0C 00 3C 00 00 00 00 00 D8
C898: 00 00 00 00 00 00 08 00 A0
C8A0: 09 09 00 00 00 00 00 09 BB
C8A8: B5 80 80 00 00 80 09 09 F1
C8B0: 00 00 00 8F C3 61 8F 18 0D
C8B8: D2 8F 61 D2 C3 8F 61 C3 C7
C8C0: DA 68 0C 30 8F 61 0C 61 9E
C8C8: 61 8F 61 0C 47 0C 0C 00 86
C8D0: 0C 61 8F D2 8F 61 D2 C3 28
C8D8: 8F 61 C3 DA 68 0C 30 8F 9C
C8E0: 0C 98 61 61 8F 61 0C 47 8C
C8E8: 0C 0C 00 00 00 18 D2 C3 AF
C8F0: D2 18 D2 D2 D2 18 D2 C3 03
C8F8: D1 C3 D2 18 C3 D1 1F D1 FF
C900: C3 D2 18 18 8F 01 18 00 6F
C908: 00 18 D2 C3 D2 18 D2 D2 47
C910: D2 D2 D2 C3 D1 00 FF 20 3E
C918: 10 08 0A 0E 0F 0A 08 0F 78
C920: 10 0A 08 10 0B 09 07 0B 78
C928: 0A 08 07 08 08 0A 08 07 6A
C930: 06 07 07 00 07 08 0A 0F 6C
C938: 0A 08 0F 10 0A 08 10 0B 96
C940: 09 07 0B 0A 07 05 08 08 81
C948: 0A 08 07 06 07 07 00 00 75
C950: 00 0E 0F 10 0F 0E 0F 0F B8
C958: 0F 0E 0F 10 12 10 0F 0E D3
C960: 10 12 15 12 10 0F 0E 0E E4
C968: 0C 0C 0E 00 00 0E 0F 10 BB
C970: 0F 0E 0F 0F 0F 0F 0F 10 E8
C978: 12 00 00 01 A2 00 A9 07 DE
C980: 9D 00 D8 9D FF D8 9D FE 0A
C988: D9 9D E7 DA E8 E0 00 D0 5D
C990: EF 60 00 00 00 A2 00 A9 2D
C998: 66 9D AE 04 9D 45 05 9D D4
C9A0: 57 05 9D EE 05 9D 85 06 B7
C9A8: 9D 97 06 9D 2E 07 BD 2B 9F
```

```
C9B0: C3 9D D6 04 9D FE 04 9D 2B
C9B8: 6D 05 9D 95 05 9D 7F 05 85
C9C0: 9D A7 05 9D 16 06 9D 3E A0
C9C8: 06 9D AD 06 9D D5 06 9D 37
C9D0: BF 06 9D E7 06 9D 56 07 1D
C9D8: 9D 7E 07 BD 2E C3 9D 26 6F
C9E0: 05 9D BD 05 9D CF 05 9D 56
C9E8: 66 06 9D FD 06 9D 0F 07 AA
C9F0: 9D A6 07 E8 E0 03 D0 9F 79
C9F8: A2 00 A9 A0 9D 47 04 9D 6C
CA00: E7 04 9D 87 05 9D 27 06 E0
CA08: 9D C7 06 9D 67 07 A9 00 29
CA10: 9D 47 D8 9D E7 D8 9D 87 51
CA18: D9 9D 27 DA 9D C7 DA 9D 6F
CA20: 67 DB 18 8A 69 28 AA E0 23
CA28: 78 D0 CF A9 14 8D B8 C3 09
CA30: A9 00 8D 1F C3 8D 20 C3 BB
CA38: 8D 7A C9 8D 59 C3 8D 50 92
CA40: C3 8D 35 C3 A9 01 8D 1E E0
CA48: C3 8D 7B C9 20 0F C3 A9 7B
CA50: 00 8D 1E D0 20 A1 C2 AD FE
CA58: 1E D0 D0 F3 AD 00 D0 85 10
CA60: FB AD 01 D0 85 FC A9 01 09
CA68: 8D 32 C3 8D 34 C3 8D 33 32
CA70: C3 EE 33 C3 20 90 CB 4C E2
CA78: BC CA FB 40 FB 00 FB FB 30
CA80: 00 FF 00 FF 00 FF 00 FF 80
CA88: 00 FF 00 FF 00 FF 00 77 FF
CA90: 24 FF 00 FF 00 FF 00 FF B4
CA98: 00 FF 00 FF 00 FF 00 77 10
CAA0: 00 FF 00 FF 27 FF 25 FF EC
CAA8: 24 FF 00 FF 25 FF 00 55 47
CAB0: 14 FF 00 FF 25 FF 35 FF 1F
CAB8: 37 FF 17 77 AE 7B C9 20 92
CAC0: 10 C2 20 9D C1 CA E0 00 BE
CAC8: D0 F5 20 06 C0 20 CA C1 23
CAD0: EA EA EA AD 7A C9 F0 0B 7F
CAD8: EA EA EA A9 00 8D 7A C9 15
CAE0: 4C BC CA AD 59 C3 F0 03 73
CAE8: 4C 2A CB 20 5A C3 20 F4 7E
CAF0: CA 4C BC CA A9 06 8D 27 F3
CAF8: C5 A2 00 E8 E0 00 D0 FB F7
CB00: CE 27 C5 AD 27 C5 D0 F1 19
CB08: 60 A9 00 8D 54 C3 AD 53 B8
CB10: C3 C9 C4 F0 0A CE 53 C3 43
CB18: AD 53 C3 8D F8 07 60 EE B9
CB20: 53 C3 4C 18 CB 80 7B 80 E3
CB28: 5A 80 A2 00 BD 7A CB 9D 47
CB30: C2 05 BD 85 CB 9D 02 07 AD
CB38: E8 E0 0B D0 EF A9 41 8D 46
CB40: 63 C3 A9 40 8D 9C C3 A9 E8
CB48: 09 8D B8 C3 20 5A C3 20 B9
CB50: F4 CA AD 00 DC 29 10 D0 A4
CB58: F3 A2 00 AD 7E CB 9D C2 47
CB60: 05 9D 02 07 E8 E0 0B D0 B1
CB68: F5 A9 00 8D 63 C3 8D 9C E6
CB70: C3 A9 14 8D B8 C3 4C 00 48
CB78: C0 11 07 01 0D 05 20 20 A4
CB80: 20 0F 16 05 12 10 12 05 04
CB88: 13 13 20 20 06 09 12 05 15
CB90: A2 00 BD 2A CC 9D 49 04 D2
CB98: BD 38 CC 9D C1 04 BD 46 C2
CBA0: CC 9D 01 06 BD 54 CC 9D 8E
CBA8: 79 06 A9 07 9D 49 D8 9D 36
CBB0: C1 D8 9D 01 DA 9D 79 DA B6
CBB8: E8 E0 07 D0 D5 A2 00 BD 90
CBC0: 31 CC 9D 71 04 BD 3F CC 9B
CBC8: 9D E9 04 BD 4D CC 9D 29 F2
CBD0: 06 BD 5B CC 9D A1 06 A9 AB
CBD8: 0D 9D 71 D8 9D E9 D8 9D CB
CBE0: 29 DA 9D A1 DA E8 E0 07 CF
CBE8: D0 D5 A9 07 8D 77 D8 8D AB
CBF0: ED D8 8D 2E DA 8D A4 DA 5B
CBF8: A2 00 BD 85 CB 9D 52 04 9E
CC00: BD 1F CC 9D 5D 04 E8 E0 72
CC08: 0B D0 EF AD 00 DC 29 10 97
CC10: D0 F9 A2 00 A9 20 9D 52 37
CC18: 04 E8 E0 16 D0 F8 60 20 46
CC20: 20 14 0F 20 20 13 14 01 CB
CC28: 12 14 E9 A0 A0 A0 A0 A0 5B
CC30: A0 97 89 9A 81 92 84 69 8E
CC38: 20 E9 A0 A0 A0 20 20 20 84
CC40: 94 81 87 69 20 20 E9 A0 12
CC48: A0 A0 A0 A0 20 8C 85 96 93
CC50: 85 8C 69 20 20 E9 A0 A0 37
CC58: 20 20 20 20 B0 B0 69 20 C3
CC60: 20 20 FB 00 FB AD A3 06 EF
CC68: C9 B9 F0 04 EE A3 06 60 D9
CC70: A9 B0 8D A3 06 EE A2 06 99
CC78: 60 02 0F 02 02 0C 01 03 FD
CC80: 0B 0D 05 12 00 FF 00 FF AF
```

PINBALL ARCADE
FROM PAGE 29

Starting address in hex: C000
Ending address in hex: C707
SYS to start: 49152

Flankspeed **required for entry! See page 93.**

```
C000: A9 8A A0 C4 20 1E AB 20 A3
C008: 3A C4 A0 00 B9 D5 C5 99 96
C010: C0 36 C8 C0 C0 90 F5 A0 78
C018: 7F A9 00 99 80 37 88 10 2B
C020: FA A8 A9 7E 99 80 37 C8 06
C028: C8 C8 C0 40 90 F6 A9 3C 28
C030: 8D C3 37 8D CF 37 A9 7E 75
C038: 8D C6 37 8D C9 37 8D CC AC
C040: 37 A0 18 B9 7C C5 99 00 C5
C048: D4 88 10 F7 A0 06 B9 35 43
C050: C5 99 F8 07 88 10 F7 A9 E9
C058: 0F 8D 2D D0 A9 01 8D 27 52
C060: D0 A9 3E 8D 1C D0 A9 06 43
C068: 8D 26 D0 A9 0E 8D 25 D0 28
C070: A9 40 8D 17 D0 A9 00 8D 07
C078: 1D D0 8D 1B D0 20 5A C3 1E
C080: A9 33 8D 3F 04 20 2D C3 3F
```

```
C088: A9 48 8D D8 C4 8D 00 D0 04
C090: A9 01 8D D9 C4 0D 10 D0 55
C098: 8D 10 D0 20 F2 C1 A9 00 85
C0A0: 8D DE C4 20 13 C2 A9 7F F0
C0A8: 8D 15 D0 A9 05 8D DD C4 FA
C0B0: AD 00 DC 29 03 AA 18 AD D7
C0B8: DD C4 7D E0 C4 C9 03 90 DB
C0C0: 14 C9 10 B0 10 8D DD C4 9F
C0C8: 0A 18 69 C6 8D 01 D0 18 92
C0D0: 69 08 8D 0D D0 A2 19 20 89
C0D8: 31 C4 AD 00 DC 29 10 D0 63
C0E0: CF A2 54 8E 0B D4 E8 8E 8D
C0E8: 0B D4 A9 01 8D DC C4 A9 4C
C0F0: A0 8D DB C4 AD DD C4 4A 5A
C0F8: 4A 49 03 29 03 8D DA C4 E8
C100: A2 05 20 31 C4 AD DD C4 0E
C108: F0 0A 0A 18 69 CE 8D 0D F7
C110: D0 CE DD C4 38 AD 01 D0 0A
C118: E9 02 8D 01 D0 C9 70 B0 4E
C120: DF 8D D7 C4 AD 8D 02 D0 38
C128: FB E6 03 AD DF C4 F0 11 62
C130: 20 03 C2 18 AD DF C4 69 E9
C138: 01 29 3F 8D DF C4 4C 52 72
C140: C1 A4 04 AD 00 DC 29 10 6E
C148: 85 04 D0 06 98 F0 03 EE 24
C150: DF C4 AC DC C4 A5 03 39 25
C158: E8 C4 D0 03 20 1E C2 AC 87
C160: DA C4 A5 03 39 E8 C4 D0 60
C168: 03 20 7B C2 18 AD DB C4 30
C170: 69 03 A8 AD DC C4 69 00 3E
C178: C9 08 B0 06 8D DC C4 8C BC
C180: DB C4 A2 02 20 31 C4 AD 89
C188: D7 C4 C9 F6 B0 24 8D 01 49
C190: D0 AD D8 C4 8D 00 D0 AD B8
C198: 10 D0 29 FE 0D D9 C4 8D DA
C1A0: 10 D0 AD DE C4 F0 08 CE 9A
C1A8: DE C4 D0 03 20 13 C2 4C 62
C1B0: 24 C1 A9 7E 8D 15 D0 18 4A
C1B8: A5 A2 69 28 C5 A2 D0 FC C8
C1C0: CE 3F 04 AD 3F 04 C9 30 BD
C1C8: F0 03 4C 88 C0 A9 00 85 81
C1D0: C6 EE 86 02 A2 18 A0 0C 76
C1D8: 18 20 F0 FF A9 C5 A0 C4 D6
C1E0: 20 1E AB A2 C8 20 31 C4 4C
C1E8: 20 E4 FF C9 0D D0 E2 4C C4
C1F0: 80 C0 A0 0F A9 03 99 CC F4
C1F8: DB 88 10 FA A9 00 8D DF 7F
C200: C4 A9 30 09 0F AA A0 0F 11
C208: BD 3C C5 99 CC 07 CA 88 88
C210: 10 F6 60 A2 04 A9 00 9D 65
C218: 28 D0 CA 10 FA 60 18 AD 0D
C220: D7 C4 79 F0 C4 A8 AE D8 1C
C228: C4 AD D9 C4 20 AF C2 C9 95
C230: 20 D0 06 A5 FC 8D D7 C4 F3
C238: 60 AE D7 C4 E0 EC 90 23 65
C240: AD DF C4 F0 25 38 A5 05 8B
C248: E9 0C C9 10 B0 1C AC DA 6C
C250: C4 B9 28 C5 8D DA C4 AD 97
C258: 00 DC 29 03 A8 B9 E4 C4 6D
C260: 4C 70 C2 C9 05 B0 03 20 82
C268: EB C2 AC DC C4 B9 20 C5 05
C270: 8D DC C4 A5 A2 29 3F 8D DD
C278: DB C4 60 18 AD D8 C4 79 56
C280: F0 C4 AA AD D9 C4 79 F8 9F
C288: C4 AC D7 C4 20 AF C2 C9 F2
C290: 20 D0 0B A5 FD 8D D8 C4 5B
C298: A5 FE 8D D9 C4 60 C9 05 98
C2A0: B0 03 20 EB C2 AC DA C4 6F
C2A8: B9 20 C5 8D DA C4 60 84 5A
C2B0: FC 86 FD 85 FE A9 00 85 E5
C2B8: A7 A9 04 85 A8 38 98 E9 F6
C2C0: 30 4A 4A 4A A8 18 A5 A7 DD
C2C8: 69 28 85 A7 A5 A8 69 00 3F
C2D0: 85 A8 88 D0 F0 38 8A E9 F5
C2D8: 14 85 05 A5 FE E9 00 4A 50
C2E0: 66 05 46 05 46 05 A4 05 8C
C2E8: B1 A7 60 A8 A9 07 99 28 BD
C2F0: D0 AD 32 04 48 BE 30 C5 A2
C2F8: A0 04 38 B9 30 04 69 00 2D
C300: C9 3A 90 02 A9 30 99 30 3A
C308: 04 88 10 EF CA D0 E9 68 82
C310: CD 32 04 F0 0B AC 3F 04 FF
C318: C8 C0 3A B0 03 8C 3F 04 5F
C320: A2 14 8E 04 D4 E8 8E 04 B9
C328: D4 8E DE C4 60 A0 00 B9 E9
C330: 30 04 D9 48 04 F0 05 B0 31
C338: 0B 4C 4F C3 C8 C0 06 90 C2
C340: EE 4C 4F C3 A0 05 B9 30 1E
C348: 04 99 48 04 88 10 F7 A0 63
C350: 05 A9 30 99 30 04 88 10 95
C358: FA 60 A9 00 8D 20 D0 8D 69
C360: 21 D0 A9 8E A0 C4 20 1E 2E
C368: AB A9 50 85 39 85 3B A9 37
C370: 04 85 3A A9 D8 85 3C A2 1B
C378: 00 BD 95 C6 85 02 A0 00 BA
C380: 46 02 90 08 A9 A0 91 39 76
C388: A9 02 91 3B C8 C0 08 90 23
C390: EF 18 A5 39 69 08 85 39 A7
C398: 85 3B A5 3A 69 00 85 3A 62
C3A0: 18 69 D4 85 3C E8 E0 73 F5
C3A8: 90 CF A9 4E 8D 66 05 A9 A3
C3B0: 0F 8D 66 D9 A9 0A 85 02 C8
C3B8: A6 02 BC 00 C5 BD 0B C5 72
C3C0: AA 18 20 F0 FF A9 BC A0 9B
C3C8: C4 20 1E AB C6 02 10 E8 39
C3D0: A9 00 8D 86 02 A9 04 85 C3
C3D8: 02 A6 02 8A 0A A8 BD 16 94
C3E0: C5 48 0A 0A 0A 18 69 18 A6
C3E8: 99 02 D0 BD 1B C5 48 0A 46
C3F0: 0A 0A 18 69 34 99 03 D0 28
C3F8: 68 AA 68 A8 18 20 F0 FF 46
C400: A0 03 A5 02 09 40 20 D2 87
C408: FF 20 D2 FF 20 D2 FF A9 97
C410: 11 20 D2 FF A9 9D 20 D2 4E
C418: FF 20 D2 FF 20 D2 FF 88 86
C420: D0 E0 C6 02 10 B3 A9 48 50
```

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 91 and 92 explain these codes and provide other essential information on entering ***Ahoy!*** programs. Refer to these pages **before** entering any programs!

```
C428: 8D 0C D0 A9 60 8D 10 D0 0B
C430: 60 A0 C8 C8 D0 FD CA D0 2D
C438: FA 60 AD 0E DC 29 FE 8D E1
C440: 0E DC A5 01 29 FB 85 01 7D
C448: A9 D0 85 3C A9 38 85 3A 26
C450: A0 00 84 3B 84 39 A2 08 19
C458: B1 3B 91 39 C8 D0 F9 E6 8A
C460: 3C E6 3A CA D0 F2 A5 01 F2
C468: 09 04 85 01 AD 0E DC 09 9D
C470: 01 8D 0E DC AD 18 D0 29 A9
C478: F0 09 0E 8D 18 D0 A0 3F D6
C480: B9 95 C5 99 08 3A 88 10 0A
C488: F7 60 8E 08 93 00 0D 20 38
C490: 20 1E 53 43 4F 52 45 20 6C
C498: 05 30 30 30 30 30 30 20 DE
C4A0: 20 20 9C 54 55 52 4E 53 1B
C4A8: 20 05 33 20 20 20 81 48 2B
C4B0: 49 47 48 20 05 30 30 30 3F
C4B8: 30 30 30 00 9E C1 C2 11 7D
C4C0: 9D 9D C3 C4 00 12 20 20 D6
C4C8: 50 52 45 53 53 20 52 45 0F
C4D0: 54 55 52 4E 20 20 00 00 5B
C4D8: 00 00 00 00 00 00 00 00 D8
C4E0: 00 01 FF 00 03 02 00 01 E7
C4E8: 00 01 03 07 07 03 01 00 FE
C4F0: FF FF FF FF 01 01 01 01 F4
C4F8: FF FF FF FF 00 00 00 00 F8
C500: 0B 11 14 1A 05 20 0D 18 94
C508: 0B 1A 13 05 04 04 05 0B 5D
C510: 0B 0B 0B 11 11 15 08 12 82
C518: 1C 06 1E 08 07 08 10 10 8F
C520: 06 05 04 04 03 03 02 01 3C
C528: 00 00 01 02 05 06 07 07 44
C530: 05 0A 05 01 01 DF DC DB DE
C538: DC DD DD DE 45 47 47 48 CB
C540: 48 40 40 20 20 40 40 48 12
C548: 48 47 47 46 45 E4 EF F9 79
C550: E2 78 77 20 20 77 78 E2 36
C558: F9 EF E4 46 45 47 47 48 89
C560: 48 40 40 20 20 40 40 48 32
C568: 48 47 47 46 45 E3 F7 F8 9F
C570: 62 79 6F 20 20 6F 79 62 47
C578: F8 F7 E3 46 C7 70 00 00 CB
C580: 00 1A 09 C7 0A A0 0C 00 22
C588: 1A 0A BF 4F 00 00 00 00 BB
C590: 00 00 00 00 8F 00 07 1F 46
C598: 3F 7F 7F FE FD 00 E0 F8 AD
C5A0: FC FE FE 7F BF FD FE 7F 57
C5A8: 7F 3F 1F 07 00 BF 7F FE CB
C5B0: FE FC F8 E0 00 0F 3F 7F 54
C5B8: 7F 7F 7F 3F 0F F0 FC FE 72
C5C0: FE FE FE FC F0 00 FF FF AB
C5C8: FF FF FF FF 00 00 00 FF C8
C5D0: FF FF FF 00 00 00 AA 00 7B
C5D8: 0A 55 A0 25 FF 58 1F FF 75
C5E0: F4 9F FF F6 7D 55 7D EA A7
C5E8: AA AB 55 55 55 59 A9 A9 EB
C5F0: 69 99 99 59 99 99 59 99 0D
C5F8: 99 6A A9 A9 55 55 55 EA 3B
C600: AA AB 7D 55 7D 9F FF F6 3D
C608: 1F FF F4 25 FF 58 0A 55 F8
C610: A0 00 AA 00 00 00 AA 00 06
C618: 0A 55 A0 25 FF 58 1F FF B4
C620: F4 9F FF F6 7D 55 7D EA E6
C628: AA AB 55 55 55 5A 96 A5 15
C630: 59 56 65 5A 96 65 55 96 87
C638: 65 5A 96 A5 55 55 55 EA 1F
C640: AA AB 7D 55 7D 9F FF F6 7D
C648: 1F FF F4 25 FF 58 0A 55 39
C650: A0 00 AA 00 00 00 AA 00 46
C658: 0A 55 A0 25 FF 58 1F FF F4
C660: F4 9F FF F6 7D 55 7D EA 27
C668: AA AB 55 55 55 56 56 A5 11
C670: 5A 56 65 56 56 65 56 56 45
C678: 65 5A 96 A5 55 55 55 EA 5F
C680: AA AB 7D 55 7D 9F FF F6 BD
C688: 1F FF F4 25 FF 58 0A 55 79
C690: A0 00 AA 00 00 FF FF FF DB
C698: FF FF FF 00 00 00 FC 0F A4
C6A0: 00 00 00 E0 03 00 00 00 84
C6A8: C0 01 00 00 00 80 01 00 EB
C6B0: 00 00 80 03 00 00 00 80 B4
C6B8: 03 00 00 00 A0 07 00 00 63
C6C0: 00 A0 07 00 3E 00 A0 0F 56
C6C8: 00 00 00 B0 0F 00 00 00 88
C6D0: B8 1F 00 00 00 B8 07 00 68
C6D8: 00 00 A0 01 00 00 00 A0 1B
C6E0: 01 00 00 00 A0 03 00 00 85
C6E8: 00 B0 03 00 00 00 B0 07 54
C6F0: 00 00 00 B8 0F 00 00 00 B8
C6F8: BC 3F 00 00 00 BF FF 01 B5
C700: 00 C0 BF FF 0F 00 F0 BF 40
```

BASIC ESTHETICS

FROM PAGE 32

```
·1 REM ---------------------------------- EM
·2 REM          DEFAULT PROMPTER          DA
·3 REM          RUPERT REPORT #39         PB
·4 REM ---------------------------------- EM
·5 REM  INITIAL ALPHANUMERIC KEY ERASES   CO
·6 REM  DEFAULT VALUE.                    DB
·7 REM  PRESS [DEL] TO BACKSPACE.         LG
·8 REM  PRESS [RETURN] WHEN DONE.         FF
·9 REM                                    JD
·10 PROMPT$="WHAT FILENAME? "             AA
·20 DFLT$="FILE#01"                       AL
·30 FL$=DFLT$ : LF=LEN(FL$)               BF
·40 CSR$=CHR$(175)+CHR$(157)              OK
```

```
·50 BS$=CHR$(20) : CR$=CHR$(13)        NP
·60 REM ============================== IO
·70 PRINT PROMPT$;DFLT$;CSR$;           AJ
·80 GOSUB 200    :REM GET FIRST KEY     DJ
·90 IF K$=BS$ OR K$=CR$ THEN 120        EL
·100 GOSUB 500   :REM  FIRST CHARACTER  NL
·110 GOSUB 200   :REM  GET NEXT KEYSTROKE MI
·120 IF K$=BS$ THEN GOSUB 300 : GOTO 110
  : REM HANDLE DELETE KEY               GA
·130 IF K$=CR$ THEN GOTO 400 :  REM  DONE
  IF RETURN KEY                         NK
·140 :REM  HANDLE OTHER KEYS            PF
·150 FL$=FL$+K$ : LF=LF+1               BA
·160 PRINT K$;CSR$;                     II
·170 GOTO 110                           CC
·180 REM ============================== HD
·200 :REM  ---    GET KEYSTROKE    ---  HL
·210 GET K$ : IF K$="" THEN 210         GK
·220 IF K$=CR$ OR K$=BS$ THEN 240       EM
·230 IF ASC(K$)<32 OR ASC(K$)>127 THEN 21
 0                                      JB
·240 RETURN                             IM
·300 :REM  ---  HANDLE DELETE KEY  ---  FI
·310 IF LF>0 THEN PRINT BS$;CSR$;       FO
·320 LF=LF-1 : IF LF<0 THEN LF=0        OB
·330 FL$=LEFT$(FL$,LF)                  PF
·340 RETURN                             IM
·400 :REM  ---  HANDLE RETURN KEY  ---  MN
·410 PRINT " "                          AD
·420 PRINT"FILENAME IS "FL$ : PRINT     HM
·430 RUN                                II
·500 :REM  ---  HANDLE FIRST KEY   ---  GE
·510 :  REM  ERASE DEFAULT VALUE        LA
·520 FOR N=1 TO LF : PRINT BS$; : NEXT  GE
·530 FL$=K$ : LF=1                      KL
·540 PRINT K$;CSR$;                     II
·550 RETURN                             IM
```

C-64 COMPRESSOR
FROM PAGE 78

COMPRESSOR.O

Starting address in hex: C000
Ending address in hex: C1A3
SYS to start: 49152

***Flankspeed* required for entry! See page 93.**

```
C000: 20 38 C1 85 FB A5 64 85 2B
C008: FC 20 38 C1 85 FD A5 64 AC
C010: 85 FE 20 38 C1 85 F9 A5 D3
C018: 64 85 FA A5 FC C9 D0 90 CA
C020: 0A 78 A5 01 29 FD 85 01 F6
C028: 4C 31 C0 A5 01 29 FE 85 BA
C030: 01 A9 00 85 02 20 53 C0 96
C038: A2 07 A0 00 CA E0 00 F0 1F
C040: 0A A9 7B 91 FD 20 0F C1 EF
C048: 4C 3C C0 A5 01 09 03 85 C9
C050: 01 58 60 A0 00 B1 FB C9 22
C058: 7B F0 2E 8D FC 03 A2 04 27
C060: CA E0 00 F0 42 C8 D1 FB D5
C068: F0 F6 8E FD 03 88 E8 E0 32
C070: 04 D0 FA A0 00 B1 FB 91 20
C078: FD 20 01 C1 20 0F C1 20 6A
C080: 1D C1 A5 02 D0 CC 4C 53 44
C088: C0 91 FD 20 01 C1 20 0F EA
C090: C1 A9 7B 91 FD 20 0F C1 F7
C098: A9 01 91 FD 20 0F C1 20 E3
C0A0: 1D C1 A5 02 F0 AD 60 A2 C8
C0A8: 03 20 1D C1 A5 02 C9 FF 1C
C0B0: F0 1F CA E0 00 D0 F2 C8 F8
C0B8: 20 1D C1 A5 02 C9 FF F0 1A
C0C0: 10 AD FC 03 C0 FF D0 05 15
C0C8: A0 FF 4C D1 C0 D1 FB F0 07
C0D0: E6 8C FE 03 A9 7B A0 00 0C
C0D8: 91 FD 20 0F C1 AD FC 03 07
C0E0: 91 FD 20 0F C1 AD FE 03 11
C0E8: 91 FD 20 0F C1 A2 00 E8 F4
C0F0: 20 01 C1 EC FE 03 D0 F7 8B
C0F8: A5 02 C9 FF F0 39 4C 53 34
C100: C0 18 A5 FB 69 01 85 FB 66
C108: A5 FC 69 00 85 FC 60 18 0F
C110: A5 FD 69 01 85 FD A5 FE 46
C118: 69 00 85 FE 60 38 A5 F9 3E
C120: E9 01 85 F9 C9 00 D0 0F 34
C128: A5 FA E9 01 85 FA C9 FF FD
C130: F0 01 60 A9 FF 85 02 60 14
C138: 20 FD AE 20 9E AD 20 CE 60
C140: B1 A5 65 60 20 38 C1 85 FC
C148: F9 A5 64 85 FA 20 38 C1 E6
C150: 85 FB A5 64 85 FC 20 38 B6
C158: C1 85 FD A5 64 85 FE A6 D2
C160: B8 20 C9 FF 38 A5 FB E5 C2
C168: F9 85 FB A5 FC E5 FA 85 EC
C170: FC A5 FD 20 D2 FF A5 FE A8
C178: 20 D2 FF A0 00 B1 F9 20 D7
C180: D2 FF 18 A5 F9 69 01 85 FA
C188: F9 A5 FA 69 00 85 FA 38 45
C190: A5 FB E9 01 85 FB A5 FC 41
C198: E9 00 85 FC C9 FF D0 DB 7B
C1A0: 60 00 00 00 01
```

DECOMPRESSOR.O

Starting address in hex: C000
Ending address in hex: C0FF
SYS to start: 49152

***Flankspeed* required for entry! See page 93.**

```
C000: 20 36 C0 A5 02 A2 A7 A0 A9
C008: 02 20 BD FF A9 00 A2 08 3C
C010: A0 01 20 BA FF A9 00 20 56
C018: D5 FF A0 00 84 02 20 5C 91
C020: C0 A4 02 99 A7 02 A5 64 D4
C028: 99 A8 02 C8 C8 84 02 C0 45
C030: 04 D0 EB 4C 68 C0 20 FD 84
C038: AE 20 9E AD 20 A3 B6 A0 6E
C040: 00 B1 64 85 02 C8 B1 64 BC
C048: 85 F9 C8 B1 64 85 FA A0 C7
```

```
C050: 00 B1 F9 99 A7 02 C8 C4 CC
C058: 02 D0 F6 60 20 FD AE 20 6F
C060: 9E AD 20 CE B1 A5 65 60 B8
C068: AD A8 02 C9 D0 B0 09 A5 BA
C070: 01 29 FE 85 01 4C 7F C0 AC
C078: 78 A5 01 29 FC 85 01 AD F1
C080: A7 02 85 F9 AD A8 02 85 87
C088: FA AD A9 02 85 FB AD AA B6
C090: 02 85 FC 20 9E C0 A5 01 3B
C098: 09 03 85 01 58 60 A0 00 84
C0A0: B1 F9 C9 7B F0 28 91 FB 38
C0A8: 20 B2 C0 20 C0 C0 4C A0 CA
C0B0: C0 60 18 A5 F9 69 01 85 79
C0B8: F9 A5 FA 69 00 85 FA 60 9D
C0C0: 18 A5 FB 69 01 85 FB A5 0C
C0C8: FC 69 00 85 FC 60 C8 B1 8C
C0D0: F9 C9 7B D0 07 C0 05 F0 9E
C0D8: D8 4C CE C0 A0 00 20 B2 01
C0E0: C0 B1 F9 8D F8 02 20 B2 A8
C0E8: C0 B1 F9 AA AD F8 02 91 3A
C0F0: FB 20 C0 C0 CA E0 00 D0 0B
C0F8: F3 20 B2 C0 4C A0 C0 00 2E
```

PICMASHER

```
·0 REM ********************************** DN
·1 REM *****        PICMASHER       ***** OA
·2 REM ***** BY SCOTT MILLER PETTY ***** AG
·3 REM ***** 407 B. SMITH AVENUE    ***** MA
·4 REM ***** CHAPEL HILL, N.C.      ***** NA
·5 REM *****                27514   ***** EF
·6 REM ***** (919)-967-8522         ***** EO
·7 REM ********************************** DN
·10 IFZ<>0THEN175 NH
·15 IFA=0THENA=1:LOAD"COMPRESSOR.O",8,1 DC
·20 IFA=1THENA=2:POKE56,19:POKE55,135:CLR
 :A=2:DIMF$(3) CN
·25 POKE53281,15:POKE53280,12:POKE646,6 LD
·30 S$="[HOME][RVSON][c 4][16" "]PICMASHE
 R[15" "][RVSOFF]":PA=30960 JN
·35 KO$="[RVSON]"+CHR$(193)+"[RVSOFF]PIC
 ":MI$="PIC." MJ
·40 PRINT"[CLEAR]"S$"[8"[DOWN]"]"TAB(12)"
 [RVSON][RED]K[RVSOFF][BLUE]OALA":PRINTTA
 B(12)"[DOWN][RVSON][RED]M[RVSOFF][BLUE]I
 CROILLUSTRATOR" KM
·45 PRINTTAB(12)"[DOWN][RVSON][RED]O[RVSO
 FF][BLUE]THER" HI
·50 WAIT198,15:GETT$:BG=0:BO=0 HP
·55 IFT$="K"THENP$=KO$:P=1:L1=32576:L2=33
 576:L3=24576:BG=34576:BO=0 LJ
·60 IFT$="M"THENP$=MI$:P=1:L1=6384:L2=738
 4:L3=8384:BG=6364:BO=6365 HL
·65 IFT$<>"O"ANDT$<>"M"ANDT$<>"K"THEN50 MD
·70 IFT$="O"THENPRINT"[CLEAR]"S$:GOTO95 BJ
·75 PRINT"[CLEAR]"S$:INPUT"[RED][DOWN][RI
 GHT]FILENAME OF PICTURE ";F$:P$=P$+F$ OF
·80 PRINT"[UP]"TAB(23)"[RVSON][BLUE]"P$"[
 RVSOFF]":IFLEFT$(P$,1)<>CHR$(18)THEN95 HO
·85 L=LEN(P$):IFL<17THENP$=P$+CHR$(32):GO
 TO85 MM
·90 P$=RIGHT$(P$,14):P$=CHR$(129)+P$ NO
·95 INPUT"[RED][DOWN][RIGHT]NEW LOAD ADDR
 ESS OF PIC ";F:N$=RIGHT$(STR$(F),LEN(STR
 $(F))-1) PJ
·100 PRINT"[UP]"TAB(27)"[RVSON][BLUE]"N$"
 [LEFT][RVSOFF]":F1=INT(F/256):F2=F-256*F
 1 LJ
·105 IFPTHEN165 CG
·110 PRINT"[RED][RIGHT][DOWN]FILE LOADS I
 N [RVSON][PURPLE]1[RVSOFF] [RVSON]2[RVSO
 FF] [RVSON]3[RVSOFF][RED] PARTS ?":WAIT1
 98,15:GETT$:D=VAL(T$) MF
·115 PRINT"[UP]"TAB(15)"[BLUE][RVSON]  "T
 $"  [RVSOFF]" NB
·120 FORI=1TOD:PRINT"[DOWN][RIGHT][RED]FI
 LENAME OF PART"I:INPUT"[UP][20"[RIGHT]"]
 ";F$(I) HA
·125 PRINT"[UP][RVSON][BLUE]"TAB(22)F$(I)
 "[RVSOFF]":NEXT:P$=F$(1):F$=P$ PG
·130 INPUT"[DOWN][RIGHT][RED]ADDRESS OF V
 IDEO MATRIX IS ";L1 MJ
·135 L1$=RIGHT$(STR$(L1),LEN(STR$(L1))-1)
 :PRINT"[UP]"TAB(30)"[RVSON][BLUE]"L1$"[L
 EFT][RVSOFF]" EM
·140 INPUT"[DOWN][RIGHT][RED]ADDRESS OF C
 OLOR MEMORY IS ";L2 DA
·145 L2$=RIGHT$(STR$(L2),LEN(STR$(L2))-1)
 :PRINT"[UP]"TAB(30)"[RVSON][BLUE]"L2$"[L
 EFT][RVSOFF]" BI
·150 INPUT"[DOWN][RIGHT][RED]ADDRESS OF Y
 OUR BIT MAP IS ";L3 PO
·155 L3$=RIGHT$(STR$(L3),LEN(STR$(L3))-1)
 :PRINT"[UP]"TAB(30)"[RVSON][BLUE]"L3$"[L
 EFT][RVSOFF]" GM
·160 FORI=1264TO1743:POKEI,32:NEXT:PRINT"
 [HOME][6"[DOWN]"]" HB
·165 K$="[RVSON][c 4][40" "][RVSOFF]":PRI
 NT"[DOWN]"K$"[DOWN]"K$ JF
·170 PRINT"[3"[UP]"][RED][RVSON]  INSERT
 PICTURE DISK AND HIT [BLUE] RETURN [RED]
   [RVSOFF]":WAIT198,15:GETT$ IM
·175 IFPTHEN195 CJ
·180 IFZ=0THENZ=1:LOADF$(1),8,1 BI
·185 IFD>1THENIFZ=1THENZ=2:LOADF$(2),8,1 HN
·190 IFD>2THENIFZ=2THENZ=3:LOADF$(3),8,1 KP
·195 IFZ=0THENZ=1:LOADP$,8,1 LC
·200 IFL3=24576THENP$=RIGHT$(P$,14):P$="[
 RVSON][s A][RVSOFF]"+P$ ME
·205 PRINT"[RIGHT]"P$" IS NOW LOADED" GJ
```

```
·210 PRINT"[DOWN]"K$"[DOWN]"K$:BG=PEEK(BG
 ):BO=PEEK(BO)                                OB
·215 PRINT"[3"[UP]"][RED][RVSON]INSERT DE
 STINATION DISK AND HIT [BLUE] RETURN [RV
 SOFF]":WAIT198,15:GETT$                      MO
·220 CP=49152:SV=CP+324                       AL
·225 IFL1>29960ANDL1<40960THENPA=5000         DA
·230 IFL2>29960ANDL2<40960THENPA=5000         KA
·235 IFL3>29960ANDL3<40960THENPA=5000         DA
·240 SYSCP,L1,PA,1000                         IC
·245 RA=PEEK(253)+256*PEEK(254)               IA
·250 SYSCP,L2,RA,1000                         LH
·255 RA=PEEK(253)+256*PEEK(254)               IA
·260 SYSCP,L3,RA,8000                         LL
·265 RA=PEEK(253)+256*PEEK(254)               IA
·270 IFL3=24576THENF$=RIGHT$(F$,LEN(F$)-2
 )                                            KM
·275 OPEN2,8,2,F$+CHR$(160)+N$+",P,W":SYS
 SV,PA,RA,F:PRINT#2,CHR$(BG)CHR$(BO)          DP
·280 CLOSE2:SYS65484:PRINTTAB(6)"[DOWN][B
 LUE]OLD FILE LENGTH = 1[4"0"] BYTES"         LK
·285 PRINTTAB(6)"NEW FILE LENGTH =";:RA=R
 A-PA:PRINTRA"BYTES":SA=10000-RA              BF
·290 PRINTTAB(6)"[RED][29"[s *]"][BLUE]"      MG
·295 PRINTTAB(6)"MEMORY SAVED[4" "]="SA"B
 YTES":PRINTTAB(13)"[DOWN][RED][RVSON] HI
 T ANY KEY [UP][RVSOFF]"                      KC
·300 WAIT198,15:GETT$                         CI
·305 PRINT"[CLEAR]"S$"[3"[DOWN]"][RED] AN
 OTHER FILE (Y/N)[BLUE]":WAIT198,15:GETT$     PN
·310 IFT$="Y"THENZ=0:OPEN15,8,15:PRINT#15
 ,"I0:":CLOSE15:GOTO25                        GH
```

DECOMPRESSOR DEMO

```
·0 REM ********************************       DN
·1 REM *****   DECOMPRESSOR DEMO    *****     CH
·2 REM ********************************       DN
·10 IFA>0THEN25                               LI
·15 POKE53280,12:POKE53281,15:PRINT"[BLUE
 ]":POKE56,126:POKE55,244:CLR                 AP
·20 IFA=0THENA=1:PRINT"[CLEAR]":LOAD"DECO
 MPRESSOR.O",8,1                              KH
·25 T$="[HOME][RVSON][c 4][12" "]DECOMPRE
 SSOR DEMO[11" "]":PRINTT$                    FB
·30 IFA=1THENA=2:POKE53265,PEEK(53265)OR1
 6:INPUT"[DOWN][RIGHT][BLUE]FILENAME OF P
 ICTURE ";F$                                  LD
·35 INPUT"[DOWN][RIGHT][BLUE]LOAD ADDRESS
  OF PIC ";LA                                 BM
·40 PRINT"[DOWN][DOWN][3" "][RVSON][c 4]
 HIT + KEY TO CHANGE BORDER COLOR."           NJ
·45 PRINT" [RVSON][c 4] HIT - KEY TO CHAN
 GE BACKGROUND COLOR."                        JJ
·50 PRINT"[3" "][RVSON][c 4] HIT ANY OTHE
 R KEY TO EXIT HIRES. ":FORI=0TO1000:NEXT     CP
·55 PRINT"[DOWN][BLUE][9" "][RVSON] HIT R
 UN/STOP TO END [RVSOFF]"                     MB
·60 GOSUB115:GOSUB100:POKE53265,PEEK(5326
 5)OR16:D1=49152:D2=D1+26                     PI
·65 SYSD1,F$,LA,52224:R1=PEEK(249)+256*PE
 EK(250)+6                                    MP
·70 SYSD2,R1,55296:R2=PEEK(249)+256*PEEK(
 250)+6:SYSD2,R2,57344                        BF
·75 R3=PEEK(249)+256*PEEK(250)+6:POKE5328
 1,PEEK(R3+1):POKE53280,PEEK(R3+2)            CP
·80 WAIT198,15:GETT$:IFT$="+"THENBO=BO+1:
 IFBO>15THENBO=0                              IH
·85 IFT$="-"THENBG=BG+1:IFBG>15THENBG=0       NG
·90 IFT$="+"ORT$="-"THENPOKE53281,BG:POKE
 53280,BO:GOTO80                              JE
·95 GOSUB115:WAIT198,15:GETT$:GOSUB100:GO
 TO80                                         HI
·100 REM ******* CHANGE BANKS *********       CN
·105 POKE53272,56:POKE53265,PEEK(53265)OR
 32:POKE53270,PEEK(53270)OR16                 LA
·110 POKE56578,PEEK(56578)OR3:POKE56576,(
 PEEK(56576)AND252)OR0:RETURN                 IN
·115 REM ****** NORMAL SCREEN ********        MP
·120 POKE53272,21:POKE53265,PEEK(53265)AN
 D223:POKE53270,PEEK(53270)AND239             JK
·125 POKE56578,PEEK(56578)OR3:POKE56576,(
 PEEK(56576)AND252)OR3:RETURN                 JM
```

RELOCATOR

```
·0 REM ********************************       DN
·1 REM *****       RELOCATOR        *****     PF
·2 REM ********************************       DN
·8 IFA>0THEN110                               OH
·10 POKE53281,15:POKE53280,12:POKE646,6       LD
·20 S$="[CLEAR][RVSON][c 4][16" "]RELOCAT
 OR[15" "][RVSOFF]"                           PI
·30 PRINTS$"[3"[DOWN]"][RIGHT][BLUE]RELOC
 ATE [RVSON][RED]C[RVSOFF][BLUE]OMPRESSOR
  OR [RVSON][RED]D[RVSOFF][BLUE]ECOMPRESS
 OR ?"                                        PB
·40 WAIT198,15:GETT$:IFT$="C"THENF$="COMP
 RESSOR.O":L=417                              AN
·50 IFT$="D"THENF$="DECOMPRESSOR.O":L=255     LN
·60 IFT$<>"C"ANDT$<>"D"THEN40                 PJ
·70 PRINT"[DOWN][DOWN][RIGHT][c 4][RVSON]
 INSERT DISK CONTAINING "F$" "                HM
·80 PRINT"[RIGHT][c 4][RVSON][12" "]AND H
 IT RETURN[10" "]";:IFL=255THENPRINT"  "      JM
·90 WAIT198,15:GETT$:IFT$<>CHR$(13)THEN90     FK
·100 IFA=0THENA=1:LOADF$,8,1                  HK
·110 PRINT"[RVSOFF]":INPUT"[DOWN][DOWN][R
 IGHT][BLUE]NEW LOCATION ";N                  CL
·120 INPUT"[DOWN][RIGHT]NEW FILENAME ";F$     FP
·130 A=INT(N/256):B=N-256*A:PRINT"[DOWN][
 DOWN]"TAB(12)"[c 4][3"."]WORKING[3"."]"      JG
·140 OPEN2,8,2,F$+",P,W":PRINT#2,CHR$(B);
 :PRINT#2,CHR$(A);                            EB
·150 FORI=49152TOI+L                          IB
·160 P=PEEK(I):IFP<>76ANDP<>108ANDP<>32TH
```

```
ENPRINT#2,CHR$(P);:GOTO300                    PJ
•170 Z=PEEK(I+2):IFZ<192ORZ>194THENPRINT#
2,CHR$(P);:GOTO300                            OC
•180 X=49152-N:Y=PEEK(I+1):A=Y+Z*256-X:Z=
INT(A/256):Y=A-256*Z                          HI
•190 PRINT#2,CHR$(P);:PRINT#2,CHR$(Y);:PR
INT#2,CHR$(Z);:I=I+2:GOTO300                  HO
•200 IFL=255THEN220                           GE
•210 CLOSE2:PRINT"[DOWN][DOWN][c 4][RIGHT
]NEW VALUE FOR 'CP' = "N:END                  LJ
•220 CLOSE2:PRINT"[DOWN][DOWN][c 4][RIGHT
]NEW VALUE FOR 'DC' = "N:END                  OD
•300 IFI=49152+LTHEN200                       MO
•310 NEXT                                     IA
```

STOW AWAY
FROM PAGE 62

```
•10 REM *** STOW AWAY *** BUCK CHILDRESS
***                                           DB
•20 REM *** P.O. BOX 13575 SALEM, OR 9730
9 ***                                         DC
•30 PRINTCHR$(147)"LOADING AND CHECKING D
ATA LINE:":J=52000:L=100                      FO
•40 PRINTCHR$(19)TAB(31)L:PRINT:FORB=0TO1
1:READA:IFA<0ORA>255THEN60                    LP
•50 POKEJ+B,A:X=X+A:NEXTB:READA:IFA=XTHEN
70                                            BP
•60 PRINT"ERROR IN DATA LINE:"L:END           HL
•70 X=0:J=J+12:L=L+10:IFL<851THEN40           OG
•80 PRINT"THE DATA IS OK AND LOADED[3"."]
":PRINT                                       GI
•90 PRINT"SYS 52[3"0"] TO ACTIVATE[3"."]"
:END                                          GE
•100 DATA173,2,3,174,3,3,201,67,208,5,224
,203,1266                                     DO
•110 DATA208,1,96,141,162,206,142,163,206
,169,27,160,1681                              FB
•120 DATA206,32,30,171,169,67,162,203,76,
186,204,32,1538                               EM
•130 DATA96,165,173,0,2,201,65,144,55,201
,91,176,1369                                  IG
•140 DATA51,173,1,2,208,46,169,255,160,20
4,32,30,1331                                  PA
•150 DATA171,32,228,255,201,49,144,249,20
1,53,176,245,2004                             EH
•160 DATA72,32,233,204,104,201,49,208,96,
160,1,177,1537                                EF
•170 DATA43,208,16,32,241,204,169,188,160
,205,32,30,1528                               NH
•180 DATA171,76,116,164,76,134,164,173,16
4,206,240,10,1694                             KF
•190 DATA32,248,204,169,238,160,205,32,20
4,204,169,100,1965                            DB
•200 DATA160,206,32,30,171,32,53,204,140,
165,206,32,1431                               CA
•210 DATA77,204,173,165,206,240,6,32,151,
204,76,163,1697                               KN
•220 DATA203,32,195,204,162,14,142,164,20
6,181,43,157,1703                             LF
•230 DATA168,206,202,16,248,32,53,204,32,
77,204,161,1603                               KM
•240 DATA251,129,253,32,151,204,76,196,20
3,201,50,208,1954                             LE
•250 DATA76,173,164,206,208,10,32,241,204
,169,200,160,1843                             CG
•260 DATA205,76,126,203,160,1,177,43,240,
10,32,248,1521                                BH
•270 DATA204,169,247,160,205,32,204,204,1
69,113,160,206,2073                           EO
•280 DATA32,30,171,32,195,204,141,165,206
,162,14,189,1541                              GD
•290 DATA168,206,149,43,202,16,248,32,53,
204,160,53,1534                               DM
•300 DATA120,32,70,204,32,77,204,161,253,
129,251,32,1565                               KG
•310 DATA151,204,76,20,204,201,51,240,95,
173,162,206,1783                              EB
•320 DATA174,163,206,32,186,204,169,46,16
0,206,76,129,1751                             DL
•330 DATA204,165,43,166,44,133,251,134,25
2,162,0,160,1714                              DG
•340 DATA160,134,253,132,254,96,169,47,13
3,0,132,1,1511                                JI
•350 DATA96,165,251,197,45,208,249,165,25
2,197,46,208,2079                             ML
•360 DATA243,173,165,206,240,6,169,0,141,
165,206,96,1810                               PL
•370 DATA104,104,160,55,120,32,70,204,88,
169,128,160,1394                              LM
•380 DATA206,32,30,171,173,167,206,174,16
6,206,32,205,1768                             DK
•390 DATA189,169,153,160,206,32,30,171,76
,116,164,104,1570                             JC
•400 DATA104,160,55,120,32,70,204,88,169,
66,160,206,1434                               FE
•410 DATA76,129,204,238,166,206,208,3,238
,167,206,230,2071                             EF
•420 DATA251,208,4,230,252,240,224,230,25
3,208,14,230,2344                             GF
•430 DATA254,240,216,165,254,201,192,208,
4,169,224,133,2260                            IF
•440 DATA254,96,120,141,2,3,142,3,3,88,96
,169,1117                                     HN
•450 DATA0,141,166,206,141,167,206,96,32,
30,171,169,1525                               EI
•460 DATA3,160,206,32,30,171,32,228,255,2
01,89,240,1647                                HC
•470 DATA12,201,78,208,245,32,233,204,104
```

```
,104,76,116,1613                                    KK
·480 DATA164,32,210,255,169,13,76,210,255
,169,161,160,1874                                   NL
·490 DATA205,76,30,171,169,209,160,205,76
,30,171,147,1649                                    KF
·500 DATA29,29,29,29,29,29,29,29,29,29,29
,29,348                                             BJ
·510 DATA29,29,18,32,83,84,79,87,32,65,87
,65,690                                             HB
·520 DATA89,32,13,17,17,49,41,32,42,32,83
,84,531                                             EG
·530 DATA79,87,32,65,32,80,82,79,71,82,65
,77,831                                             GL
·540 DATA32,42,13,17,50,41,32,42,32,83,65
,76,525                                             PO
·550 DATA86,65,71,69,32,65,32,80,82,79,71
,82,814                                             FC
·560 DATA65,77,32,42,13,17,51,41,32,42,32
,82,526                                             JG
·570 DATA69,84,85,82,78,32,84,79,32,66,65
,83,839                                             MP
·580 DATA73,67,32,42,13,17,52,41,32,42,32
,68,511                                             MB
·590 DATA69,65,67,84,73,86,65,84,69,32,83
,84,861                                             JM
·600 DATA79,87,32,65,87,65,89,32,42,13,17
,87,695                                             EC
·610 DATA72,65,84,32,87,79,85,76,68,32,89
,79,848                                             BK
·620 DATA85,32,76,73,75,69,32,84,79,32,68
,79,784                                             MF
·630 DATA63,32,210,157,0,17,89,79,85,32,6
8,79,911                                            AP
·640 DATA78,39,84,32,72,65,86,69,32,65,32
,80,734                                             LA
·650 DATA82,79,71,82,65,77,32,0,73,78,32,
77,748                                              GB
·660 DATA69,77,79,82,89,46,13,0,83,84,79,
87,788                                              MF
·670 DATA69,68,46,13,0,17,89,79,85,32,65,
76,639                                              GK
·680 DATA82,69,65,68,89,32,72,65,86,69,32
,65,794                                             DH
·690 DATA32,80,82,79,71,82,65,77,32,0,83,
84,767                                              LO
·700 DATA79,87,69,68,46,13,0,73,78,32,77,
69,691                                              KP
·710 DATA77,79,82,89,46,13,0,17,65,82,69,
32,651                                              MC
·720 DATA89,79,85,32,83,85,82,69,63,32,40
,89,828                                             MB
·730 DATA47,78,41,32,210,157,0,17,83,84,7
9,87,915                                            DM
·740 DATA32,65,87,65,89,32,73,83,32,79,78
,46,761                                             EJ
·750 DATA13,0,17,83,84,79,87,32,65,87,65,
89,701                                              CL
·760 DATA32,73,83,32,79,70,70,46,13,0,17,
84,599                                              HM
·770 DATA72,69,32,76,69,78,71,84,72,32,69
,88,812                                             CK
·780 DATA67,69,69,68,83,32,49,54,51,56,52
,32,682                                             BA
·790 DATA66,89,84,69,83,46,13,0,17,83,84,
79,713                                              PD
·800 DATA87,73,78,71,46,46,46,13,0,17,83,
65,625                                              PD
·810 DATA76,86,65,71,73,78,71,46,46,46,13
,0,671                                              DN
·820 DATA17,68,79,78,69,46,46,46,13,17,84
,72,635                                             AH
·830 DATA69,32,76,69,78,71,84,72,32,73,83
,32,771                                             NO
·840 DATA0,32,66,89,84,69,83,46,13,0,66,6
7,615                                               FO
·850 DATA0,0,80,67,10,0,0,0,0,0,0,0,157             NL
```

CAVERN OF GEEHONK

FROM PAGE 26

BOOTER

```
·10 POKE53280,0:POKE53281,0                         BH
·20 ONAGOTO100,110                                  LK
·30 PRINT"[CLEAR][DOWN][WHITE]"TAB(8)"AHO
Y! MAGAZINE PRESENTS"                               IP
·40 PRINT"[5"[DOWN]"]"TAB(13)"C A V E R N
 S"                                                 KG
·50 PRINTTAB(18)"[DOWN]O F"                         PF
·60 PRINTTAB(13)"[DOWN]G E E H O N K"               PG
·70 PRINT"[6"[DOWN]"]"TAB(8)"PROGRAMMED B
Y JOHN FEDOR"                                       IG
·75 PRINT"[DOWN][DOWN]PRESS RUN/STOP TO P
AUSE DURING GAME PLAY"                              CG
·80 PRINTTAB(6)"[DOWN]PLEASE WAIT WHILE L
OADING[3"."][HOME]"                                 DJ
·90 A=1:LOAD "COG.SP",8,1                           ME
·100 A=2:LOAD "COG.ML",8,1                          IH
·110 SYS52531                                       KO
```

COG.SP

Starting address in hex: 3B00
Ending address in hex: 4007

***Flankspeed* required for entry! See page 93.**

```
3B00: 00 00 00 00 00 00 00 00 00
3B08: 00 00 00 00 00 00 00 00 08
3B10: 3C 00 00 38 00 00 1C 00 A0
3B18: 00 3C 00 00 3C 00 0C 2C C8
3B20: 30 04 FF 10 0C FE 30 0B AA
3B28: DF F0 0F BD B0 0F 00 F0 76
3B30: 00 00 00 00 00 00 00 00 30
3B38: 00 00 00 00 00 00 00 FF 38
3B40: 00 00 00 00 00 00 00 00 40
3B48: 00 00 00 00 00 2C 00 00 74
3B50: 30 00 00 00 00 00 0C 00 8C
3B58: 00 34 00 10 2F 04 00 8C 5C
```

```
3B60: 00 30 C3 C8 03 0F 0C 00 3B
3B68: C7 40 00 3C 00 1C 00 0C D4
3B70: 3C 00 38 00 00 00 00 00 E4
3B78: 00 00 00 00 00 00 00 FF 78
3B80: 00 00 00 00 00 00 00 00 80
3B88: 00 00 04 00 00 80 00 00 0D
3B90: 00 00 00 0C 00 00 00 00 9C
3B98: 00 C1 C0 00 03 00 40 00 5E
3BA0: 00 03 00 3C 08 02 10 03 FC
3BA8: 00 33 00 00 00 00 70 00 4C
3BB0: 30 00 03 D0 00 20 00 00 D4
3BB8: 00 00 00 00 00 00 00 FF B8
3BC0: 00 00 00 00 00 00 00 00 C0
3BC8: 00 00 00 00 00 0C 00 00 D4
3BD0: 00 00 00 00 00 03 00 00 D3
3BD8: 00 00 30 00 00 00 00 00 09
3BE0: C0 0C 00 03 00 00 0C 00 BC
3BE8: 00 00 0C 00 0C 00 00 00 01
3BF0: 00 30 00 30 00 00 00 00 51
3BF8: 00 00 00 00 00 00 00 FF F8
3C00: 00 00 00 00 00 00 00 00 00
3C08: 00 00 00 00 00 00 00 00 08
3C10: 14 00 00 28 00 00 28 00 74
3C18: 00 28 00 1A AA A4 00 3C E5
3C20: 00 1A AA A4 00 28 00 00 B1
3C28: 28 00 00 28 00 00 14 00 8C
3C30: 00 00 00 00 00 00 00 00 30
3C38: 00 00 00 00 00 00 00 00 38
3C40: 00 00 00 00 00 00 00 00 40
3C48: 00 00 00 00 00 00 00 00 48
3C50: 00 00 00 14 00 18 28 24 C8
3C58: 0A 28 A0 00 AA 00 00 3C 12
3C60: 00 00 AA 00 0A 28 A0 18 F5
3C68: 28 24 00 14 00 00 00 00 C8
3C70: 00 00 00 00 00 00 00 00 70
3C78: 00 00 00 00 00 00 00 00 78
3C80: 00 00 00 00 00 00 00 00 80
3C88: 00 00 00 00 00 00 00 04 8C
3C90: 00 10 08 00 20 02 14 80 5F
3C98: 02 28 80 00 AA 00 00 3C 2A
3CA0: 00 00 AA 00 02 28 80 02 F7
3CA8: 14 80 08 00 20 04 00 10 79
3CB0: 00 00 00 00 00 00 00 00 B0
3CB8: 00 00 00 00 00 00 00 00 B8
3CC0: 00 00 00 00 00 00 00 00 C0
3CC8: 00 00 00 00 00 00 00 01 C9
3CD0: 00 40 02 00 80 02 00 80 16
3CD8: 02 14 80 00 AA 00 00 3C 56
3CE0: 00 00 AA 00 02 14 80 02 24
3CE8: 00 80 02 00 80 01 00 40 2D
3CF0: 00 00 00 00 00 00 00 00 F0
3CF8: 00 00 00 00 00 00 00 00 F8
3D00: 00 00 00 00 00 00 00 00 00
3D08: 00 00 CC 00 00 33 00 0A 12
3D10: CC A0 0A AA A0 0A 96 A0 14
3D18: 08 96 20 08 AA 20 08 28 D9
3D20: 20 00 28 00 00 28 00 00 90
3D28: 28 00 00 28 00 00 28 00 A0
3D30: 00 00 00 00 00 00 00 00 30
3D38: 00 00 00 00 00 00 00 FF 38
3D40: 00 00 00 00 00 00 00 00 40
3D48: 00 00 00 00 00 00 00 0A 52
3D50: A8 00 0A 00 00 32 00 00 35
3D58: CE A0 00 32 6A 80 CE 6A 1E
3D60: 80 32 A0 00 CE 00 00 0A 8C
3D68: 00 00 0A A8 00 00 00 00 1B
3D70: 00 00 00 00 00 00 00 00 70
3D78: 00 00 00 00 00 00 00 FF 78
3D80: 00 00 00 00 00 00 00 00 80
3D88: 00 00 00 00 00 00 00 00 88
3D90: 28 00 00 28 00 00 28 00 09
3D98: 00 28 00 00 28 00 08 28 19
3DA0: 20 08 AA 20 08 96 20 0A 5C
3DA8: 96 A0 0A AA A0 0A 33 A0 13
3DB0: 00 CC 00 00 33 00 00 00 B0
3DB8: 00 00 00 00 00 00 00 FF B8
3DC0: 00 00 00 00 00 00 00 00 C0
3DC8: 00 00 00 00 00 00 00 00 C8
3DD0: 2A A0 00 00 A0 00 00 8C C8
3DD8: 00 0A B3 02 A9 8C 02 A9 7A
3DE0: B3 00 0A 8C 00 00 B3 00 DE
3DE8: 00 A0 00 2A A0 00 00 00 54
3DF0: 00 00 00 00 00 00 00 00 F0
3DF8: 00 00 00 00 00 00 00 FF F8
3E00: 00 00 00 00 00 00 00 00 00
3E08: 00 00 33 00 00 CC 00 0A 12
3E10: 33 A0 0A AA A0 0A 96 A0 7A
3E18: 08 96 20 08 AA 20 08 28 D9
3E20: 20 00 28 00 00 28 00 00 90
3E28: 28 00 00 28 00 00 28 00 A0
3E30: 00 00 00 00 00 00 00 00 30
3E38: 00 00 00 00 00 00 00 FF 38
3E40: 00 00 00 00 00 00 00 00 40
3E48: 00 00 00 00 00 00 00 0A 52
3E50: A8 00 0A 00 00 CE 00 00 D1
3E58: 32 A0 00 CE 6A 80 32 6A 81
3E60: 80 CE A0 00 32 00 00 0A 8C
3E68: 00 00 0A A8 00 00 00 00 1B
3E70: 00 00 00 00 00 00 00 00 70
3E78: 00 00 00 00 00 00 00 FF 78
3E80: 00 00 00 00 00 00 00 00 80
3E88: 00 00 00 00 00 00 00 00 88
3E90: 28 00 00 28 00 00 28 00 09
3E98: 00 28 00 00 28 00 08 28 19
3EA0: 20 08 AA 20 08 96 20 0A 5C
3EA8: 96 A0 0A AA A0 0A CC A0 AC
3EB0: 00 33 00 00 CC 00 00 00 B0
3EB8: 00 00 00 00 00 00 00 FF B8
3EC0: 00 00 00 00 00 00 00 00 C0
3EC8: 00 00 00 00 00 00 00 00 C8
3ED0: 2A A0 00 00 A0 00 00 B3 EF
3ED8: 00 0A 8C 02 A9 B3 02 A9 7A
3EE0: 8C 00 0A B3 00 00 8C 00 B7
3EE8: 00 A0 00 2A A0 00 00 00 54
3EF0: 00 00 00 00 00 00 00 00 F0
3EF8: 00 00 00 00 00 00 00 FF F8
```

```
3F00: 00 00 00 00 00 00 00 00 00
3F08: 00 00 00 00 00 00 00 0A 12
3F10: 00 A0 0A AA A0 0A 96 A0 47
3F18: 08 96 20 08 AA 20 08 28 D9
3F20: 20 00 28 00 00 28 00 00 90
3F28: 28 00 00 28 00 00 28 00 A0
3F30: 00 00 00 00 00 00 00 00 30
3F38: 00 00 00 00 00 00 00 FF 38
3F40: 00 00 00 00 00 00 00 00 40
3F48: 00 00 00 00 00 00 00 0A 52
3F50: A8 00 0A 00 00 02 00 00 05
3F58: 02 A0 00 02 6A 80 02 6A 54
3F60: 80 02 A0 00 02 00 00 0A 8F
3F68: 00 00 0A A8 00 00 00 00 1B
3F70: 00 00 00 00 00 00 00 00 70
3F78: 00 00 00 00 00 00 00 FF 78
3F80: 00 00 00 00 00 00 00 00 80
3F88: 00 00 00 00 00 00 00 00 88
3F90: 28 00 00 28 00 00 28 00 09
3F98: 00 28 00 00 28 00 08 28 19
3FA0: 20 08 AA 20 08 96 20 0A 5C
3FA8: 96 A0 0A AA A0 0A 00 A0 DF
3FB0: 00 00 00 00 00 00 00 00 B0
3FB8: 00 00 00 00 00 00 00 FF B8
3FC0: 00 00 00 00 00 00 00 00 C0
3FC8: 00 00 00 00 00 00 00 00 C8
3FD0: 2A A0 00 00 A0 00 00 80 BC
3FD8: 00 0A 80 02 A9 80 02 A9 3B
3FE0: 80 00 0A 80 00 00 80 00 6C
3FE8: 00 A0 00 2A A0 00 00 00 54
3FF0: 00 00 00 00 00 00 00 00 F0
3FF8: 00 00 00 00 00 00 00 FF F8
4000: FF 00 FF 00 FF 00 FF 00 FF
```

COG.ML

Starting address in hex: C000
Ending address in hex: CE4F

***Flankspeed* required for entry! See page 93.**

```
C000: A9 D8 85 FC A9 28 85 FB 58
C008: 85 FD A9 04 85 FE A0 01 5F
C010: B1 FD C9 2A F0 08 AE 3C 97
C018: 03 BD 69 C0 91 FB C8 AE 08
C020: 3C 03 E8 E0 06 D0 02 A2 A4
C028: 00 8E 3C 03 C0 1D D0 E0 85
C030: AE 3D 03 8E 3C 03 18 A5 AA
C038: FB 69 28 85 FB A5 FC 69 53
C040: 00 85 FC A5 FB 85 FD 38 20
C048: A5 FC E9 D4 85 FE C9 07 FE
C050: D0 BC A5 FB C9 C0 D0 B6 91
C058: AE 3D 03 E8 E0 06 D0 02 E9
C060: A2 00 8E 3D 03 8E 3C 03 9F
C068: 60 01 03 0E 06 0E 03 20 12
C070: 97 E0 A5 62 29 1F C9 1A 1D
C078: B0 F5 A8 A9 2A 85 FB A9 C6
C080: 04 85 FC B1 FB C9 A0 D0 EF
C088: 18 18 A5 FB 69 28 85 FB 6D
C090: A5 FC 69 00 85 FC C9 07 EF
C098: D0 E9 A5 FB C9 C0 90 E3 F3
C0A0: 60 A9 A0 91 FB 60 AE 41 29
C0A8: 03 E8 8E 41 03 E0 01 F0 3A
C0B0: 01 60 A2 00 8E 41 03 AD 35
C0B8: 3E 03 85 FB AD 3F 03 85 F0
C0C0: FC A0 00 A9 20 91 FB AE 64
C0C8: 40 03 E0 01 D0 0D 38 A5 A9
C0D0: FB E9 28 85 FB A5 FC E9 EC
C0D8: 00 85 FC E0 02 D0 0D 18 34
C0E0: A5 FB 69 28 85 FB A5 FC 38
C0E8: 69 00 85 FC E0 04 D0 0D 97
C0F0: 38 A5 FB E9 01 85 FB A5 DC
C0F8: FC E9 00 85 FC E0 08 D0 1C
C100: 0D 18 A5 FB 69 01 85 FB B2
C108: A5 FC 69 00 85 FC A2 00 39
C110: B1 FB DD B1 C1 F0 40 E8 29
C118: E0 06 D0 F4 A2 00 B1 FB 15
C120: C9 A0 D0 11 E8 18 A5 FB 0F
C128: 69 28 85 FB A5 FC 69 00 47
C130: 85 FC 4C 1E C1 E0 00 D0 90
C138: 30 A5 FB 85 FD 18 A5 FC 48
C140: 69 D4 85 FE A9 07 91 FD 43
C148: A9 2A 91 FB A5 FB 8D 3E 17
C150: 03 A5 FC 8D 3F 03 60 A9 CF
C158: 00 8D 45 03 8D 3E 03 8D 8A
C160: 3F 03 8D 40 03 8D 41 03 45
C168: 60 86 02 A2 80 8E 04 D4 DB
C170: E8 8E 04 D4 A6 02 78 F8 DA
C178: 18 AD 42 03 69 05 8D 42 C1
C180: 03 AD 43 03 69 00 8D 43 B1
C188: 03 AD 44 03 69 00 8D 44 BB
C190: 03 CA D0 E4 D8 58 A6 02 ED
C198: 38 A5 FB E9 28 85 FB A5 AB
C1A0: FC E9 00 85 FC A9 20 91 65
C1A8: FB CA E0 00 D0 EA 4C 57 AF
C1B0: C1 6D 61 E0 7D 42 43 AD D2
C1B8: 12 D0 D0 FB 4C 00 C0 AD 23
C1C0: 04 DC 29 0F F0 01 60 20 4C
C1C8: 97 E0 A5 63 C9 47 90 F6 E2
C1D0: C9 D7 B0 F2 A2 00 EC 46 EB
C1D8: 03 F0 EB AD 15 D0 3D 11 9A
C1E0: C2 F0 03 E8 D0 F0 8A 0A D6
C1E8: A8 A9 04 99 04 D0 A5 63 B6
C1F0: 99 05 D0 BD 11 C2 49 FF 3B
C1F8: 2D 10 D0 8D 10 D0 AD 15 38
C200: D0 1D 11 C2 8D 15 D0 A2 D7
C208: 20 8E 0B D4 E8 8E 0B D4 ED
C210: 60 04 08 10 20 40 80 AE 1C
C218: 47 03 E8 8E 47 03 E0 02 07
C220: F0 01 60 A2 00 8E 47 03 ED
C228: A0 00 FE 04 D0 BD 04 D0 2F
C230: C9 02 B0 03 20 73 C2 20 26
C238: 27 C3 EA FE 05 D0 AD 49 D9
C240: 03 C9 FF D0 06 DE 05 D0 98
C248: DE 05 D0 E8 E8 C8 C0 06 5E
C250: D0 D8 AD 49 03 AE 48 03 ED
C258: E8 C9 FF D0 02 CA CA E0 54
C260: 00 F0 04 E0 0F D0 08 AD CB
```

```
C268: 49 03 49 FE 8D 49 03 8E 65
C270: 48 03 60 B9 11 C2 49 FF F2
C278: 2D 15 D0 8D 15 D0 B9 4C 05
C280: 03 49 FE 99 4C 03 60 00 15
C288: 00 00 00 00 00 AD 01 DC 14
C290: 29 1F 49 1F 8D 4A 03 AD C9
C298: 00 DC 29 1F 49 1F 8D 4B FE
C2A0: 03 60 A9 00 8D 41 03 8D 0D
C2A8: 3E 03 A9 04 8D 3F 03 A5 0D
C2B0: FD 29 0F AA BD 17 C3 8D B7
C2B8: 40 03 A0 00 C9 04 D0 02 3D
C2C0: A0 1D C9 08 D0 02 A0 FC C0
C2C8: 29 03 F0 02 A0 11 84 02 20
C2D0: 38 A5 FB E5 02 4A 4A 4A 71
C2D8: 85 14 A0 00 AD 40 03 C9 CD
C2E0: 01 D0 02 A0 34 C9 02 D0 26
C2E8: 02 A0 1B 29 0C F0 02 A0 6F
C2F0: 2C 84 15 38 A5 FC E5 15 8C
C2F8: 4A 4A 4A 85 FC A5 14 8D A1
C300: 3E 03 A0 00 18 AD 3E 03 E8
C308: 69 28 8D 3E 03 AD 3F 03 58
C310: 69 00 8D 3F 03 C8 C4 FC D3
C318: 90 EA 60 02 08 01 04 02 05
C320: 08 01 04 02 08 01 04 B9 F5
C328: 4C 03 C9 FF D0 06 DE 04 FA
C330: D0 DE 04 D0 BD 04 D0 C9 11
C338: F5 90 08 B9 4C 03 49 FE 18
C340: 99 4C 03 60 AE 6F 03 E8 93
C348: 8E 6F 03 E0 03 F0 01 60 7F
C350: A0 00 BE FA 07 CA E0 F0 4E
C358: B0 02 A2 F3 8A 99 FA 07 C7
C360: C8 C0 06 D0 F8 A2 00 8E EA
C368: 6F 03 60 A9 93 20 D2 FF 6B
C370: A2 0C 8E 20 D0 8E 21 D0 1F
C378: A9 00 AA 9D 00 D8 9D 00 E0
C380: D9 9D 00 DA 9D 00 DB E8 35
C388: D0 F1 A9 43 A2 00 9D 01 79
C390: 04 9D C1 07 E8 E0 1C D0 B1
C398: F5 A9 6C 8D 00 04 A9 7C 5C
C3A0: 8D C0 07 A9 7B 9D 01 04 BD
C3A8: A9 7E 9D C1 07 A9 28 85 8E
C3B0: FB A9 04 85 FC A0 00 A9 27
C3B8: E0 91 FB A0 1D 91 FB 18 8A
C3C0: A5 FB 69 28 85 FB A5 FC 18
C3C8: 69 00 85 FC C9 07 D0 E5 3C
C3D0: A5 FB C9 C0 D0 DF 60 A2 B0
C3D8: 00 8A 8D 00 D4 E8 E0 18 A7
C3E0: D0 F8 A9 0F 8D 18 D4 A2 80
C3E8: 49 8E 05 D4 A2 59 8E 0C 31
C3F0: D4 A2 29 8E 13 D4 A2 14 BE
C3F8: 8E 01 D4 A2 1E 8E 08 D4 89
C400: A2 3C 8E 0F D4 60 A5 FE 56
C408: 29 01 F0 02 C6 FC A5 FE 8D
C410: 29 02 F0 02 E6 FC A5 FE B6
C418: 29 04 F0 02 C6 FB A5 FE 9F
C420: 29 08 F0 02 E6 FB A6 FB C9
C428: E0 EA 90 02 A2 E9 E0 1F 13
C430: B0 02 A2 1F 86 FB A4 FC C8
C438: C0 3D B0 02 A0 3D C0 E3 6B
C440: 90 02 A0 E2 84 FC A5 FD 7B
C448: C9 FC B0 06 18 69 04 4C 97
C450: 48 C4 85 02 A5 FE 29 02 B4
C458: F0 02 A2 FC A5 FE 29 08 C0
C460: F0 02 A2 FD A5 FE 29 01 C2
C468: F0 02 A2 FE A5 FE 29 04 CE
C470: F0 02 A2 FF A5 FE 29 0F E2
C478: D0 02 A6 02 86 02 A5 FE 21
C480: 29 0F F0 0B A5 02 38 E9 7E
C488: 04 C5 FD F0 F9 85 02 A5 68
C490: 02 85 FD EE 26 D0 60 A6 03
C498: FF BD 52 03 8D 42 03 BD 3C
C4A0: 54 03 8D 43 03 BD 56 03 E2
C4A8: 8D 44 03 BD F8 07 85 FD BE
C4B0: BD 4A 03 85 FE BD F8 07 FD
C4B8: C9 F4 90 24 8A 0A AA BD 29
C4C0: 00 D0 85 FB BD 01 D0 85 28
C4C8: FC 20 06 C4 A6 FF A5 FD FA
C4D0: 9D F8 07 8A 0A AA A5 FB 4F
C4D8: 9D 00 D0 A5 FC 9D 01 D0 59
C4E0: A6 FF BD 58 03 C9 01 D0 3C
C4E8: 44 BD 58 03 8D 45 03 BD D9
C4F0: 5A 03 8D 3E 03 BD 5C 03 3A
C4F8: 8D 3F 03 BD 5E 03 8D 40 B5
C500: 03 BD 60 03 8D 41 03 20 16
C508: A6 C0 A6 FF AD 45 03 9D A9
C510: 58 03 AD 3E 03 9D 5A 03 55
C518: AD 3F 03 9D 5C 03 AD 40 F2
C520: 03 9D 5E 03 AD 41 03 9D B1
C528: 60 03 4C 63 C5 A6 FF BD 65
C530: 4A 03 29 10 D0 03 4C 63 3A
C538: C5 BD F8 07 85 FD 8A 0A D3
C540: AA BD 00 D0 85 FB BD 01 B9
C548: D0 85 FC A6 FF E8 86 FE B0
C550: 20 7E C5 A0 00 AD 3E 03 44
C558: 85 FB AD 3F 03 85 FC EA 37
C560: 4C 78 C5 A6 FF AD 42 03 84
C568: 9D 52 03 AD 43 03 9D 54 41
C570: 03 AD 44 03 9D 56 03 60 BF
C578: 20 0E C1 4C 0A C5 A9 01 2F
C580: 8D 45 03 20 50 CD 60 EA DF
C588: EA EA EA EA EA EA EA EA DF
C590: 78 A9 AA 8D 14 03 A9 C5 71
C598: 8D 15 03 58 60 78 A9 EA 04
C5A0: 8D 15 03 A9 31 8D 14 03 C5
C5A8: 58 60 EE 26 D0 4C 31 EA AF
C5B0: 50 4C 41 59 45 52 20 31 D0
C5B8: 50 4C 41 59 45 52 20 32 D9
C5C0: 48 49 47 48 43 41 56 45 02
C5C8: 52 4E 53 4F 46 47 45 45 24
C5D0: 48 4F 4E 4B 00 A0 04 A2 49
C5D8: 00 B9 52 03 29 F0 4A 4A 96
C5E0: 4A 4A 18 69 30 9D 98 04 61
C5E8: E8 B9 52 03 29 0F 18 69 9A
C5F0: 30 9D 98 04 E8 88 88 C0 16
C5F8: FE D0 DE A2 00 A0 04 B9 A8
C600: 53 03 29 F0 4A 4A 4A 4A 99
```

```
C608: 18 69 30 9D 38 05 E8 B9 37
C610: 53 03 29 0F 18 69 30 9D ED
C618: 38 05 E8 88 88 C0 FE D0 DF
C620: DE A2 00 A0 02 B9 64 03 65
C628: 29 F0 4A 4A 4A 4A 18 69 EC
C630: 30 9D D8 05 E8 B9 64 03 E5
C638: 29 0F 18 69 30 9D D8 05 9D
C640: E8 88 C0 FF D0 DF A0 00 C3
C648: A9 2A CC 62 03 F0 06 99 DE
C650: C0 04 C8 D0 F5 A9 20 C0 2F
C658: 06 F0 06 99 C0 04 C8 D0 4D
C660: F6 A9 2A A0 00 CC 63 03 FE
C668: F0 06 99 60 05 C8 D0 F5 ED
C670: A9 20 C0 06 F0 06 99 60 F1
C678: 05 C8 D0 F6 60 A0 00 98 A7
C680: 99 00 D8 99 00 D9 99 00 FF
C688: DA 99 E8 DA C8 D0 F1 4C 98
C690: D5 C5 EA EA EA EA EA EA AD
C698: 60 18 A2 02 A0 1F 20 F0 86
C6A0: FF A0 00 B9 B0 C5 20 D2 64
C6A8: FF C8 C0 08 D0 F5 A2 06 A9
C6B0: A0 1F 18 20 F0 FF A0 00 3A
C6B8: B9 B8 C5 20 D2 FF C8 C0 6D
C6C0: 08 D0 F5 18 A2 0A A0 21 16
C6C8: 20 F0 FF A0 00 B9 C0 C5 BA
C6D0: 20 D2 FF C8 C0 04 D0 F5 18
C6D8: 18 A2 0E A0 1F 20 F0 FF 72
C6E0: A0 00 B9 C4 C5 20 D2 FF B8
C6E8: C8 C0 07 D0 F5 18 A2 0F 0A
C6F0: A0 21 20 F0 FF A9 4F 20 DC
C6F8: D2 FF A9 46 20 D2 FF 18 C6
C700: A2 10 A0 1F 20 F0 FF A0 24
C708: 00 B9 CD C5 20 D2 FF C8 11
C710: C0 07 D0 F5 18 A2 13 A0 0D
C718: 20 20 F0 FF A0 00 B9 42 E5
C720: C7 20 D2 FF C8 C0 04 D0 39
C728: F5 18 A2 14 A0 20 20 F0 BE
C730: FF A0 00 B9 46 C7 20 D2 8B
C738: FF C8 C0 05 D0 F5 20 7D 2B
C740: C6 60 4A 4F 48 4E 46 45 23
C748: 44 4F 52 20 8D C2 A2 00 41
C750: 86 FF AD 6E 03 C9 03 F0 B3
C758: 11 C9 01 D0 04 E0 00 F0 DA
C760: 09 C9 02 D0 4C EC 70 03 B2
C768: D0 47 BC 67 03 C8 98 9D A6
C770: 67 03 C9 04 D0 3B A9 00 5E
C778: 9D 67 03 BD F8 07 C9 F4 FC
C780: B0 2C BC 71 03 C8 98 9D 8D
C788: 71 03 C9 08 D0 23 A9 00 6C
C790: 9D 71 03 BC F8 07 C8 C0 E8
C798: F0 90 0D A6 FF E8 8A 49 8A
C7A0: FF 2D 15 D0 8D 15 D0 CA F1
C7A8: 98 9D F8 07 EA EA 20 97 6C
C7B0: C4 A6 FF E8 86 FF E0 02 6E
C7B8: D0 98 AE 69 03 E8 8E 69 1E
C7C0: 03 E0 20 D0 08 20 00 C0 7E
C7C8: A2 00 8E 69 03 AE 6A 03 82
C7D0: E8 8E 6A 03 E0 10 D0 08 7F
C7D8: 20 6F C0 A2 00 8E 6A 03 C7
C7E0: AE 6B 03 E8 8E 6B 03 E0 C4
C7E8: 09 D0 0E A2 00 8E 6B 03 70
C7F0: 20 17 C2 20 BF C1 20 44 F0
C7F8: C3 20 00 C8 20 D5 C5 60 C1
C800: AD 66 03 CD 56 03 90 1A E8
C808: F0 02 B0 28 AD 65 03 CD B7
C810: 54 03 90 0E F0 02 B0 1C C5
C818: AD 64 03 CD 52 03 90 02 E2
C820: B0 12 AD 52 03 8D 64 03 DA
C828: AD 54 03 8D 65 03 AD 56 27
C830: 03 8D 66 03 AD 66 03 CD 0F
C838: 57 03 90 1A F0 02 B0 28 09
C840: AD 65 03 CD 55 03 90 0E 1B
C848: F0 02 B0 1C AD 64 03 CD EA
C850: 53 03 90 02 B0 12 AD 53 FC
C858: 03 8D 64 03 AD 55 03 8D E3
C860: 65 03 AD 57 03 8D 66 03 C7
C868: 60 20 00 CC 29 01 D0 07 B7
C870: AD 74 03 29 01 F0 11 A2 64
C878: EC AD F8 07 C9 F4 90 08 6A
C880: 20 E0 CB A2 00 8E 71 03 F2
C888: AD 73 03 29 02 D0 07 AD 5D
C890: 74 03 29 02 F0 11 A2 EC C4
C898: AD F9 07 C9 F4 90 08 20 BE
C8A0: F0 CB A2 00 8E 72 03 20 24
C8A8: E1 FF D0 15 20 9D C5 20 14
C8B0: E1 FF F0 FB 20 E1 FF D0 52
C8B8: FB 20 E1 FF F0 FB 20 90 54
C8C0: C5 EA EA EA EA 60 A2 00 35
C8C8: 8E 15 D0 8E 10 D0 CA 8E 06
C8D0: F8 07 8E F9 07 A9 F0 8D 88
C8D8: FA 07 8D FB 07 8D FC 07 FC
C8E0: 8D FD 07 8D FE 07 8D FF 94
C8E8: 07 E8 8E 17 D0 8E 1D D0 CB
C8F0: 8E 1E D0 8E 1F D0 CA 8E 46
C8F8: 1C D0 A9 05 8D 27 D0 A9 C3
C900: 0D 8D 28 D0 A9 07 8D 29 FA
C908: D0 8D 2A D0 8D 2B D0 8D 78
C910: 2C D0 8D 2D D0 8D 2E D0 25
C918: A9 01 8D 25 D0 A2 00 8A 73
C920: 1D 2C C9 E8 EC 6D 03 D0 4A
C928: F7 4C 7C CC 00 04 08 10 D1
C930: 20 40 80 A9 00 AA 9D 52 55
C938: 03 E8 E0 10 D0 F8 AD 6C F8
C940: 03 8D 62 03 8D 63 03 A9 D3
C948: 00 AA 9D 67 03 E8 E0 05 C9
C950: D0 F8 8D 6F 03 8D 70 03 1B
C958: 8D 71 03 8D 72 03 8D 3C 27
C960: 03 8D 3D 03 8D 46 03 8D 95
C968: 47 03 8D 48 03 A0 01 8C B9
C970: 49 03 98 A2 00 9D 4C 03 E4
C978: E8 E0 06 D0 F8 60 A2 00 15
C980: 8A 9D 3C 03 E8 E0 36 D0 B8
C988: F8 60 A9 00 8D 20 D0 8D 97
C990: 21 D0 8D 15 D0 A9 93 20 53
C998: D2 FF A9 05 20 D2 FF 18 25
C9A0: A2 05 A0 0D 20 F0 FF A0 A7
```

```
C9A8: 00 B9 C4 C5 20 D2 FF A9 89
C9B0: 20 20 D2 FF C8 C0 07 D0 25
C9B8: F0 18 A2 07 A0 12 20 F0 2F
C9C0: FF A9 4F 20 D2 FF A9 20 76
C9C8: 20 D2 FF A9 46 20 D2 FF 9E
C9D0: 18 A2 09 A0 0D 20 F0 FF 53
C9D8: A0 00 B9 CD C5 20 D2 FF B9
C9E0: A9 20 20 D2 FF C8 C0 07 2E
C9E8: D0 F0 18 A2 0D A0 0B 20 3E
C9F0: F0 FF A0 00 B9 15 CA 20 3C
C9F8: D2 FF C8 C0 31 D0 F5 A9 F6
CA00: 0D 20 D2 FF 20 D2 FF A0 93
CA08: 00 B9 46 CA 20 D2 FF C8 8E
CA10: C0 24 D0 F5 60 52 41 4E FD
CA18: 47 45 52 20 53 4F 46 54 54
CA20: 57 41 52 45 27 53 11 9D 79
CA28: 9D 9D 9D 9D 9D 9D 9D 9D 15
CA30: 9D 9D 9D 9D 9D 9D 9D 20 9F
CA38: 20 4A 4F 48 4E 20 46 45 34
CA40: 44 4F 52 20 20 0D 46 31 EA
CA48: 3A 0D 0D 46 33 3A 20 4C BC
CA50: 45 56 45 4C 0D 0D 46 35 13
CA58: 3A 20 4C 49 56 45 53 0D 44
CA60: 0D 46 37 3A 20 42 45 47 14
CA68: 49 4E 4F 4E 45 20 50 4C 9F
CA70: 41 59 45 52 20 32 20 50 65
CA78: 4C 41 59 45 52 2C 20 41 84
CA80: 32 20 50 4C 41 59 45 52 A1
CA88: 2C 20 53 AD 6C 03 D0 05 1B
CA90: A9 03 8D 6C 03 AD 6D 03 58
CA98: D0 05 A9 01 8D 6D 03 AD C4
CAA0: 6E 03 D0 05 A9 01 8D 6E 8E
CAA8: 03 18 A0 04 A2 11 20 F0 2D
CAB0: FF A2 00 A9 5F 18 69 0B E8
CAB8: E8 EC 6E 03 D0 F7 8D C4 1B
CAC0: CA A0 00 B9 6A CA 20 D2 0E
CAC8: FF C8 C0 0B D0 F5 18 A0 DC
CAD0: 0A A2 13 20 F0 FF AD 6D BC
CAD8: 03 18 69 30 20 D2 FF 18 98
CAE0: A0 0A A2 15 20 F0 FF AD 02
CAE8: 6C 03 18 69 30 20 D2 FF FC
CAF0: 20 E4 FF F0 FB C9 85 F0 23
CAF8: 0D C9 86 F0 19 C9 87 F0 A2
CB00: 25 C9 88 D0 EB 60 AE 6E B1
CB08: 03 E8 E0 04 D0 02 A2 01 4F
CB10: 8E 6E 03 4C A9 CA AE 6D EC
CB18: 03 E8 E0 08 D0 02 A2 01 63
CB20: 8E 6D 03 4C A9 CA AD 6C F9
CB28: 03 49 06 8D 6C 03 4C A9 6D
CB30: CA 20 33 C9 20 6B C3 20 87
CB38: 99 C6 20 BB CB 20 90 C5 B6
CB40: AD 6E 03 C9 03 F0 16 A9 DC
CB48: 01 AE 70 03 F0 02 49 03 AA
CB50: 8D 15 D0 A9 FE 8D F8 07 F9
CB58: 8D F9 07 D0 05 A9 03 4C B5
CB60: 50 CB 20 0D CC D0 FB AD F0
CB68: 1F D0 D0 F6 20 73 CD 20 A1
CB70: 4B C7 20 1C CC AD 15 D0 20
CB78: 29 03 D0 F3 AD 58 03 D0 43
CB80: EE AD 59 03 D0 E9 AD 70 52
CB88: 03 49 01 8D 70 03 AD 6E F2
CB90: 03 C9 01 D0 03 20 16 CC 35
CB98: EA EA EA EA EA EA EA EA EF
CBA0: EA EA EA EA EA EA EA EA F7
CBA8: EA AD 62 03 D0 86 AD 6E 1A
CBB0: 03 C9 01 F0 05 AD 63 03 88
CBB8: D0 F2 60 20 C6 C8 A0 D0 FD
CBC0: 8C 01 D0 8C 03 D0 A2 88 AA
CBC8: 8E 00 D0 8E 02 D0 AD 6E A5
CBD0: 03 C9 03 D0 0A A2 4F 8E FB
CBD8: 00 D0 A2 C1 8E 02 D0 60 CF
CBE0: 8E F8 07 A2 80 8E 0B D4 01
CBE8: E8 8E 0B D4 CE 62 03 60 D4
CBF0: 8E F9 07 A2 80 8E 0B D4 12
CBF8: E8 8E 0B D4 CE 63 03 60 E5
CC00: AD 1F D0 8D 74 03 AD 1E 6E
CC08: D0 8D 73 03 60 AD 12 D0 CD
CC10: D0 FB AD 1E D0 60 A9 00 83
CC18: 8D 70 03 60 20 69 C8 AE 7A
CC20: 70 03 AD 6E 03 C9 03 F0 70
CC28: 19 A0 06 BD 56 03 D0 0E DD
CC30: BD 54 03 C9 60 B0 07 29 50
CC38: F0 4A 4A 4A 4A A8 8C 46 CD
CC40: 03 60 78 F8 A0 06 18 AD 81
CC48: 54 03 6D 55 03 85 FB AD 94
CC50: 56 03 6D 57 03 85 FC A5 99
CC58: FB D8 58 29 F0 4A 4A 4A 7E
CC60: 4A 85 FB A5 FC 29 F0 D0 B9
CC68: D5 A5 FC 29 0F 0A 0A 0A 37
CC70: 0A 18 65 FB 4A C9 06 B0 BE
CC78: C5 4C 3D CC 8D 1B D0 60 6E
CC80: A2 00 BD 0B CD 20 D2 FF AC
CC88: E8 E0 28 D0 F5 18 A2 01 FC
CC90: A0 04 20 F0 FF A2 04 BD AA
CC98: 52 03 29 F0 4A 4A 4A 4A 31
CCA0: 18 69 30 20 D2 FF BD 52 55
CCA8: 03 29 0F 18 69 30 20 D2 88
CCB0: FF CA CA E0 FE D0 E0 18 EF
CCB8: A2 01 A0 11 20 F0 FF A2 C1
CCC0: 04 BD 53 03 29 F0 4A 4A 87
CCC8: 4A 4A 18 69 30 20 D2 FF 02
CCD0: BD 53 03 29 0F 18 69 30 CE
CCD8: 20 D2 FF CA CA E0 FE D0 12
CCE0: E0 18 A2 01 A0 1F 20 F0 4E
CCE8: FF A2 02 BD 64 03 29 F0 CC
CCF0: 4A 4A 4A 4A 18 69 30 20 EB
CCF8: D2 FF BD 64 03 29 0F 18 41
CD00: 69 30 20 D2 FF CA E0 FF 38
CD08: D0 E1 60 20 20 20 50 4C 18
CD10: 41 59 45 52 20 31 20 20 D3
CD18: 20 20 20 50 4C 41 59 45 F4
CD20: 52 20 32 20 20 20 20 20 65
CD28: 48 49 47 48 20 53 43 4F 4F
CD30: 52 45 20 20 D7 C3 20 7E 42
CD38: C9 20 8A C9 20 48 CD 20 CC
CD40: 8B CA 20 31 CB 4C 39 CD 07
```

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 91 and 92 explain these codes and provide other essential information on entering *Ahoy!* programs. Refer to these pages **before** entering any programs!

```
CD48: A9 13 20 D2 FF 4C 80 CC 91
CD50: A6 FF BD F8 07 C9 F4 90 04
CD58: 07 AD 15 D0 25 FE D0 06 ED
CD60: A9 00 8D 45 03 60 20 A2 03
CD68: C2 A2 80 8E 12 D4 E8 8E 3B
CD70: 12 D4 60 18 A2 01 A0 04 18
CD78: 20 F0 FF 20 47 CE AD 6E DB
CD80: 03 C9 03 D0 02 A2 03 A9 72
CD88: 89 18 69 19 CA D0 FA 8D D0
CD90: 95 CD A2 00 BD A2 CD 20 E4
CD98: D2 FF E8 E0 19 D0 F5 4C 61
CDA0: EF CD 50 52 45 53 53 20 0D
CDA8: 42 55 54 54 4F 4E 2C 20 D2
CDB0: 50 4C 41 59 45 52 20 31 D0
CDB8: 20 20 20 50 52 45 53 53 A7
CDC0: 20 42 55 54 54 4F 4E 2C EA
CDC8: 20 50 4C 41 59 45 52 20 D7
CDD0: 32 20 20 20 42 4F 54 48 91
CDD8: 20 50 4C 41 59 45 52 53 1B
CDE0: 20 50 52 45 53 53 20 42 F1
CDE8: 55 54 54 4F 4E 00 00 20 A4
CDF0: 8D C2 AD 6E 03 C9 03 F0 1E
CDF8: 17 AE 70 03 BD 4A 03 29 66
CE00: 10 D0 EC 20 8D C2 BD 4A 46
CE08: 03 29 10 F0 F6 4C 32 CE 79
CE10: 20 8D C2 AD 4A 03 29 10 B4
CE18: D0 F6 AD 4B 03 29 10 D0 E5
CE20: EF 20 8D C2 AD 4A 03 29 A4
CE28: 10 F0 F6 AD 4B 03 29 10 55
CE30: F0 EF 18 A2 01 A0 04 20 91
CE38: F0 FF A2 00 A9 20 20 D2 88
CE40: FF E8 E0 19 D0 F8 60 AE FB
CE48: 70 03 E8 60 00 FF 00 FF 05
```

RESCUE 128
FROM PAGE 77

```
10 REM *** RESCUE 128 ***                  BA
20 REM *** BUCK CHILDRESS *** P.O. BOX 1
3575, SALEM, OR 97309 ***                  LP
30 PRINTCHR$(147):PRINT:PRINT"LOADING AN
D CHECKING THE DATA[3"."]":PRINT           LN
40 FORJ=6912TO6983:READA:POKEJ,A:X=X+A:N
EXTJ:IFX=9567THEN60                        FI
50 PRINT"ERROR IN DATA[3"."]":END          IA
60 PRINT"THE DATA IS OK AND LOADED[3"."]
"                                          JG
70 PRINT:PRINT:PRINT"DO YOU WANT TO SAVE
MLRESCUE":PRINT                            BL
80 PRINT"TO "CHR$(18)"D"CHR$(146)"ISK OR
"CHR$(18)"T"CHR$(146)"APE? ";              KH
90 GETA$:IFA$="D"THEND=8:GOTO120           AG
100 IFA$<>"T"THEN90                        BD
110 D=1                                    CA
120 PRINTA$:PRINT:PRINT:PRINT"SAVING MLR
ESCUE[3"."]":PRINT                         FG
130 BANK15                                 GM
140 POKE6,8:POKE7,64:POKE8,27:SYS65469     IE
150 POKE6,0:POKE7,0:SYS65384               GA
160 POKE6,15:POKE7,D:POKE8,255:SYS65466    MM
170 POKE251,0:POKE252,27:POKE6,251         ED
180 POKE7,63:POKE8,27:SYS65496:PRINT:PRI
NT"DONE[3"."]":END                         HH
190 DATA165,45,133,251,165,46,133,252,16
0,1,145,45                                 AH
200 DATA160,3,200,177,45,208,251,200,200
,152,160,0                                 CN
210 DATA145,45,160,0,177,251,240,11,170,
200,177,251                                DC
220 DATA133,252,134,251,184,80,239,166,2
51,164,252,232                             AP
230 DATA208,1,200,232,208,1,200,142,16,1
8,140,17                                   AE
240 DATA18,96,0,0,77,76,82,69,83,67,85,6
9                                          HF
```

TURBOPOKE
FROM PAGE 61

```
10 AD=828                                  NN
20 FOR I=0TO169:READ A:POKEAD+I,A:NEXT     JC
300 DATA32,203,3,141,123,3,140,124,3,32    BK
305 DATA203,3,133,20,132,21,32,19,166      CH
310 DATA176,22,96,200,177,95,208,6,200     AG
315 DATA177,95,240,245,136,152,24,101      KD
320 DATA95,133,95,144,2,230,96,160,4       EI
325 DATA177,95,240,228,200,201,131,208     OD
330 DATA247,240,17,24,165,97,125,217,3     FK
335 DATA141,0,16,238,123,3,208,3,238       FE
340 DATA124,3,177,95,240,201,200,201,32    GA
345 DATA240,247,201,44,240,48,41,15,170    BN
350 DATA177,95,240,45,200,201,44,240,40    GH
355 DATA201,32,240,243,41,15,133,97,177    OE
360 DATA95,240,202,200,201,44,240,197      EP
365 DATA201,32,240,243,41,15,24,125,227    PL
370 DATA3,166,97,125,217,3,176,145,144     EC
375 DATA210,169,0,240,180,138,16,177,48    EE
380 DATA175,32,253,174,32,158,173,32       AC
385 DATA155,188,165,101,164,100,96,0,10    EO
390 DATA20,30,40,50,60,70,80,90,0,100      LE
395 DATA200                                BI
```

PROGRAMS NEEDED

Send your best Commodore 64 or 128 utilities, games, productivity, or miscellaneous programs on disk to: *Ahoy!* Program Submissions Department, Ion International Inc., 45 West 34th Street–Suite 407, New York, NY 10001. Include a printout, introductory article, and a stamped, self-addressed envelope.

C-64 COMPRESSOR

Continued from page 80

be compressing *Micro-Illustrator* or *Koala Painter* files, *Picmasher* should need no explanation—just run the program and follow the onscreen prompts. Those who use another commercial drawing program, or those programmers who use their own format for storing multicolor hi-res pictures, can still try to use *Picmasher.* There is one limitation and a few pieces of information which you must supply to *Picmasher.* Limitation: *Picmasher* can compress hi-res files that load in up to but not greater than three parts. As for the information you must supply:

1. The filename(s) of the file(s) which compose your picture.
2. The address of the video matrix data within the file(s) that make up your picture. This is the data that occupies the screen memory portion of your hi-res drawing. This section of data will be 1000 bytes long and is used to assign color to each pixel on your TV or monitor screen.
3. The address of the color data within your file(s). Again, this will be 1000 bytes long and, again, this data helps determine the colors of the pixels on your screen.
4. The address of the bit-map data within your file(s). This area of data will be 8000 bytes long and is used to determine the on/off status of each of your display's 8000 pixels.

Supply these bits of information (no pun intended), and *Picmasher* should be able to successfully compress your drawing. Note: *Picmasher*, for your reference, will write the loading address of your compressed picture after the filename. This number should not be used when loading the compressed file—it is for your information only.

DECOMP DEMO

Decomp Demo is easy to use, and requires only the filename and the loading address of the compressed file. One point of interest within the program: Lines 65-70 demonstrate the decompression of serially compressed files. *Picmasher* first compresses the video matrix, then the color memory, and finally the bit-map data. Each of the three sections is followed by a spacer which consists of the number 123 repeated six times. Thus, when decompressing the single compressed file (which contains three separate compressions), the spacer must be skipped. Memory locations 249 and 250 hold the last byte of memory PEEKed by *Decompressor.* To skip to the next section of compressed data, the following calculation is used:

```
R(1 or 2)=PEEK(249)+256*PEEK(250)+6
```

Any time that you need to find the last data location (of the compressed data) PEEKed by *Decompressor,* simply use the above equation.

RELOCATOR

Relocator will relocate *Compressor* or *Decompressor* to any area of free RAM, save the relocated file, and will then note, onscreen, the new SYS locations for the relocated ML. Just type in *Relocator,* run it, and follow the instructions given on your screen. If you use a relocated version of *Compressor* or *Decompressor* with *Picmasher* or *Decomp Demo*, be sure to change the appropriate lines within the latter two programs (lines 220 and 60 respectively).

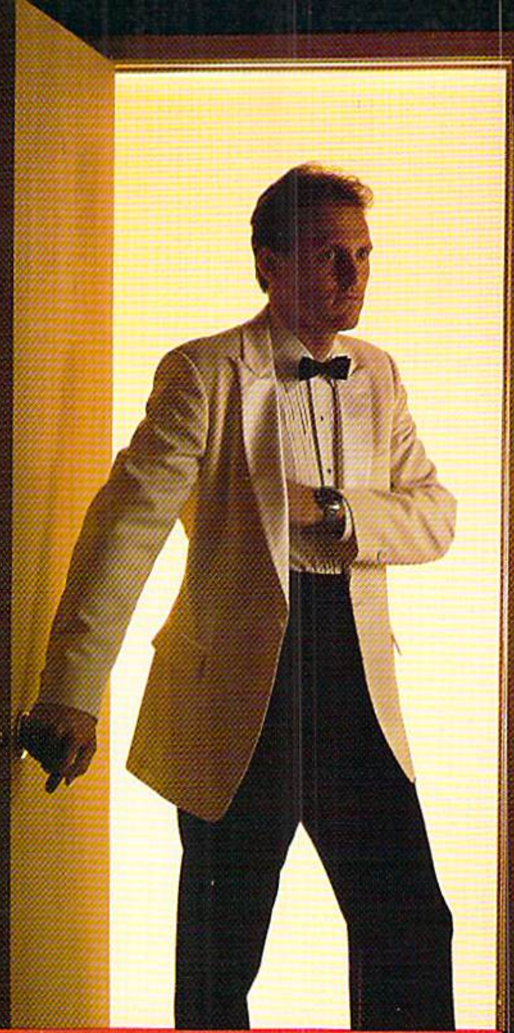
OTHER USES FOR COMPRESSOR AND DECOMPRESSOR

Well, here is where your imagination is the limit. You could save a block of low-res screens, and decompress the screen you need to the current active displayed screen, toggling between screens with SYS calls to *Decompressor.* How about your larger programs—save disk space and load time by compressing these files. Sequential files could also be compressed by loading the old sequential file into memory, compressing that file, and saving that file as a sequential file by using the built-in save routine in *Compressor:*

```
OPEN2,8,2,"compressed seq file,S,W"
SYS CP+324, SA, EA, LA:CLOSE2
```

Anything, as long as it resides or can be loaded into the C-64's RAM, can be compressed and decompressed using *Compressor* and *Decompressor*, and the benefits are many: smaller files make for faster loading, increased disk space, and fewer headaches. ☐

SEE PROGRAM LISTING ON PAGE 103



The very first commercially available, full graphics, modem game

Enter into the world of fast-action espionage. You are an agent for the government and you have a simple mission to perform. That mission? Save the world.

The fate of the free world hangs in balance as you face the challenge of executing Operation Terminal.

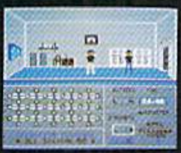
To thwart your opponent, you will be forced to make critical, split second decisions. Only your ingenuity and superior intelligence can save the world from destructive enemy forces.

The challenge is just a phone call away.

Call Your Adversary and Share the Adventure of

OPERATION TERMINAL





- Two player with modem
  One player option without modem
- Full color graphics
- The most inexpensive, practical and enjoyable way to use your modem with no monthly service charge
- No long distance telephone bills (if played locally)
- FREE bulletin board service gives you access to other players in your area
- Instruction manual included
- Requires Commodore™ 64/128 disk drive and joystick, modem optional
- Operation Terminal is compatible with most modem brands

Reader Service No. 236

Available on disk for suggested retail price of $39.95. Order by phone with Visa or MasterCard by calling (312) 672.4247 or 672.4248

For mail orders, send check or money order plus $2.50 for shipping and handling. Illinois residents add 7% sales tax. To:

DREAMRIDER SOFTWARE INC.

970 North Main Street, Crete, Illinois 60417